Popular Mechanics Magazine

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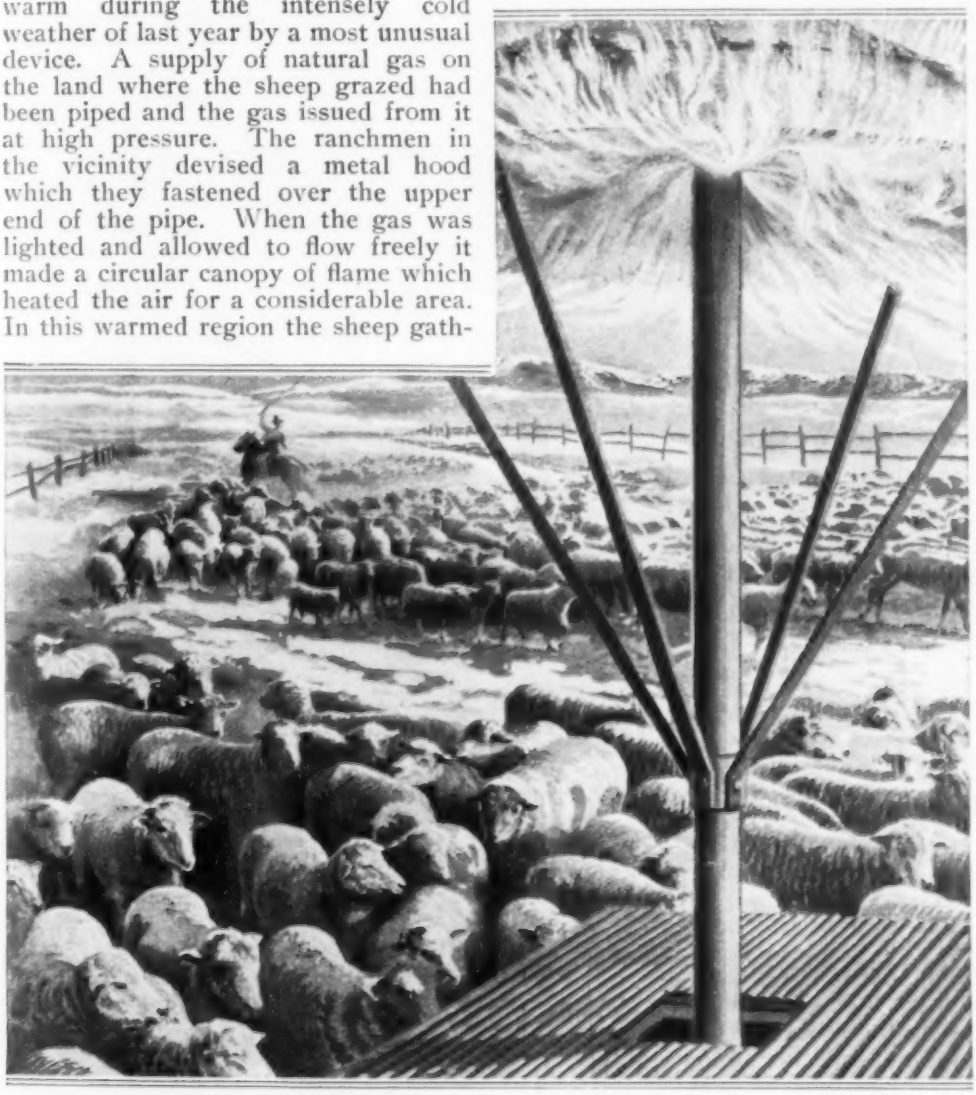
WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 26 DECEMBER, 1916 No. 6

Flame from Gas Well Keeps Sheep Warm

THROUGH the ingenuity of certain ranchers in the state of Washington their sheep were kept warm during the intensely cold weather of last year by a most unusual device. A supply of natural gas on the land where the sheep grazed had been piped and the gas issued from it at high pressure. The ranchmen in the vicinity devised a metal hood which they fastened over the upper end of the pipe. When the gas was lighted and allowed to flow freely it made a circular canopy of flame which heated the air for a considerable area. In this warmed region the sheep gathered and were made comfortable in spite of weather which otherwise would have proven too severe for them.



Sheep on a Washington Ranch Warmed in Bitterly Cold Weather by a Canopy of Flame Issuing from a Natural-Gas Well: The Peculiar Shape of the Flame is Produced by a Metal Hood Designed for the Purpose

COMBINATION TABLE LAMP AND PHONOGRAPH

With a view to making a phonograph which will occupy little space and which will have some utility in addition to playing records, an eastern concern has produced a combination electric reading lamp and phonograph. The base contains a turntable for the phonograph disks, the sound box, and a small electric motor which drives the mechanism. The sound passes up through the stem of the lamp and out into the room. The lights are arranged at the upper end of the standard and may be set within a glass reflector, if desired. A large silk or glass shade conceals the upper end of the standard and the light bulbs. To change records it is only necessary to raise the upper part of the standard, which is made in two sections, thereby revealing the turntable in the lower half of the base. When the standard is lowered there is nothing about the lamp to suggest a phonograph.

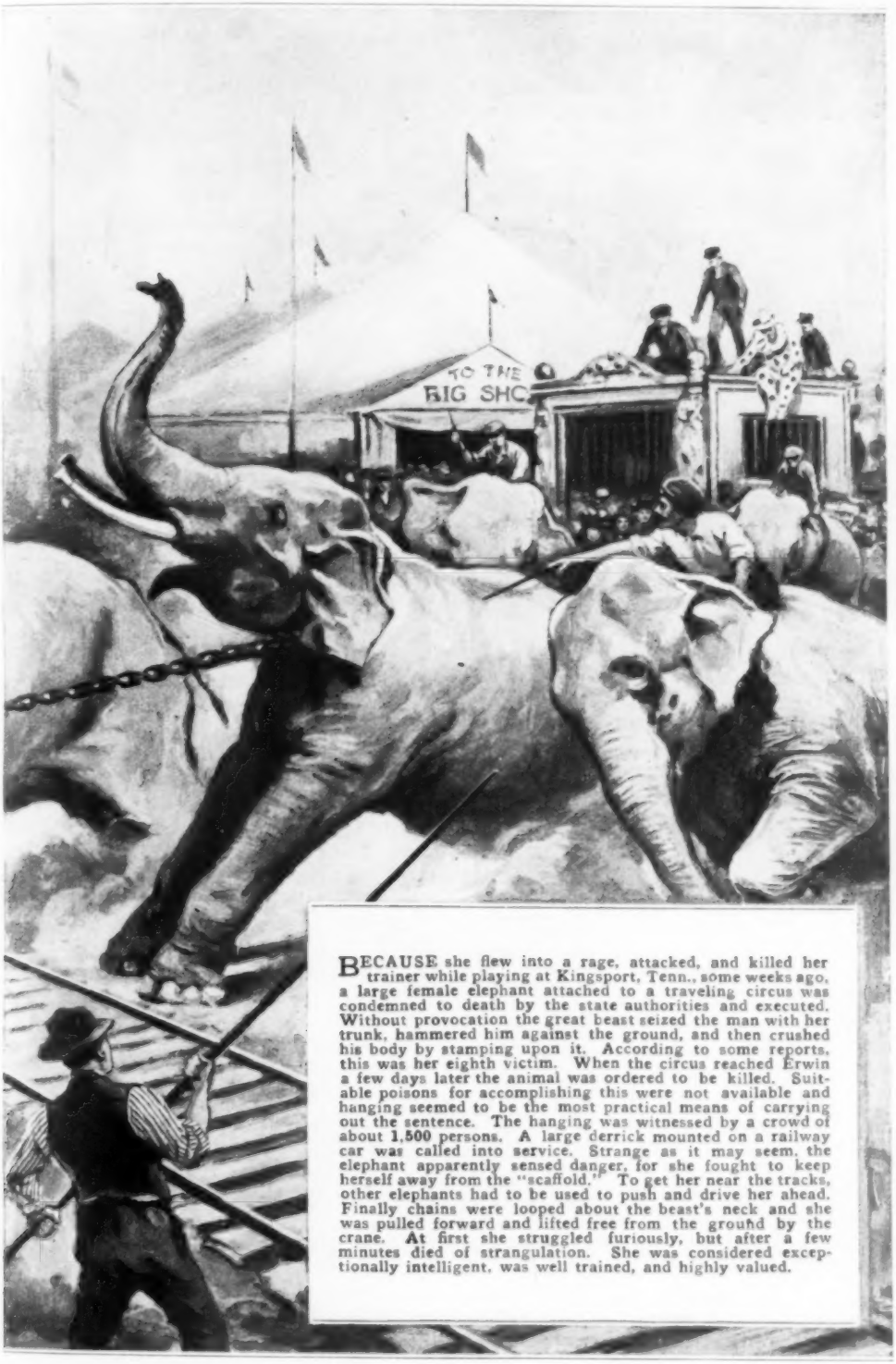
Combination Lamp and Phonograph with Upper Part of Standard Raised to Show Mechanism

Placing a Record on the Turntable, Which is Operated by a Small Electric Motor

GREAT PORT DEVELOPMENT IN RECENT YEARS

During the past five or six years there has been a remarkable development of the ports of the United States. This has been due chiefly to the increased commercial activity of the country, the completion of the Panama Canal, and the recent tendency on the part of congress to require communities receiving Federal appropriations to coöperate in making various improvements. These facts have been pointed out by an official of the Department of Commerce, who has prepared a detailed report on the condition of the 68 leading ports of the country, that is, all those which have a water-borne commerce amounting to more than 1,000,000 tons in volume, or $30,000,000 in value. The report gives much attention to the effect of public ownership on port development. Only New Orleans, San Francisco, Los Angeles, and San Diego own a major portion of their water fronts, or are in a position to acquire the bulk of it, but there are a number of others which own a substantial interest. In all such cases the development by the building of piers, terminals, etc., has been particularly marked. Thirteen cities have made decided progress toward acquiring dominating property rights in their water fronts. New York City owns a large part of its more important frontage and has many excellent piers, but is handicapped by the long-term leases which it has given. Boston, on the other hand, is cited as a city which has made really remarkable progress in the development of its port, and special attention is called to its great $4,000,000 pier and a dry dock, 1,200 ft. long, which is now under way.

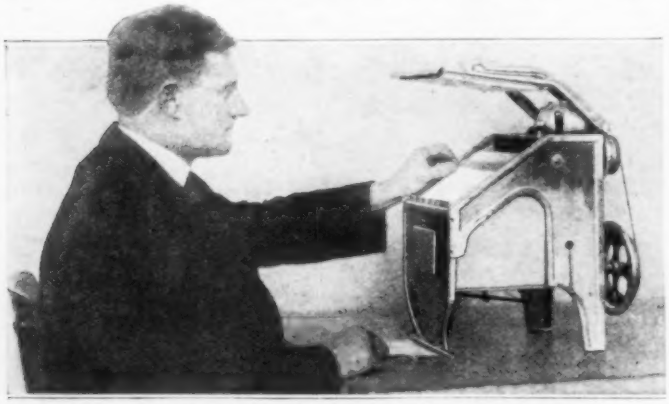
VICIOUS ELEPHANT HANGED FOR KILLING MAN



BECAUSE she flew into a rage, attacked, and killed her trainer while playing at Kingsport, Tenn., some weeks ago, a large female elephant attached to a traveling circus was condemned to death by the state authorities and executed. Without provocation the great beast seized the man with her trunk, hammered him against the ground, and then crushed his body by stamping upon it. According to some reports, this was her eighth victim. When the circus reached Erwin a few days later the animal was ordered to be killed. Suitable poisons for accomplishing this were not available and hanging seemed to be the most practical means of carrying out the sentence. The hanging was witnessed by a crowd of about 1,500 persons. A large derrick mounted on a railway car was called into service. Strange as it may seem, the elephant apparently sensed danger, for she fought to keep herself away from the "scaffold." To get her near the tracks, other elephants had to be used to push and drive her ahead. Finally chains were looped about the beast's neck and she was pulled forward and lifted free from the ground by the crane. At first she struggled furiously, but after a few minutes died of strangulation. She was considered exceptionally intelligent, was well trained, and highly valued.

PHOTOGRAPHS ARE PRINTED RAPIDLY BY MACHINE

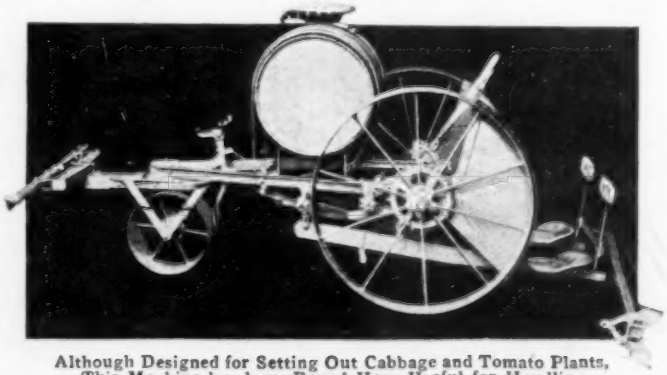
Capacity, compactness, and mechanical simplicity are a few noticeable features present in a refined model of a photographic printing apparatus that has lately been completed by a western inventor. The machine is intended to facilitate the handling of large commercial orders by speeding the work without lessening its quality, and by materially reducing labor costs. With it as many as 10,000 prints of various sizes can be run off in a day's time. The device is box-shaped, designed with an inclined top, and constructed of aluminum. It is driven by a small motor and is sufficiently light to be readily portable. The negative, from which a quantity of prints is to be made, is held in a slanting position near the top of the apparatus, immediately over the light source, which consists of high-power incandescent lamps. Flush with the inclined edge of the housing is a glass plate which supports the negative onto which the sensitized paper is fed by hand, a sheet at a time. The motor actuates the cover, opening and closing it intermittently while a switch mechanism extinguishes and ignites the lamps. After once being set, the timing switch requires no attention until a run has been finished and another negative substituted. A series of lugs, operating in grooves provided in the front side of the housing, fall and rise as the cover is opened. These hold the paper in place during the printing process and allow it to slide into a receptacle when properly exposed. They rise into place soon enough to form a supporting edge for the fresh sheet of paper that is inserted before the machine closes. Provision is made for shading the thin parts of poor negatives and regulating the timing so that good prints can frequently be obtained from inferior plates.



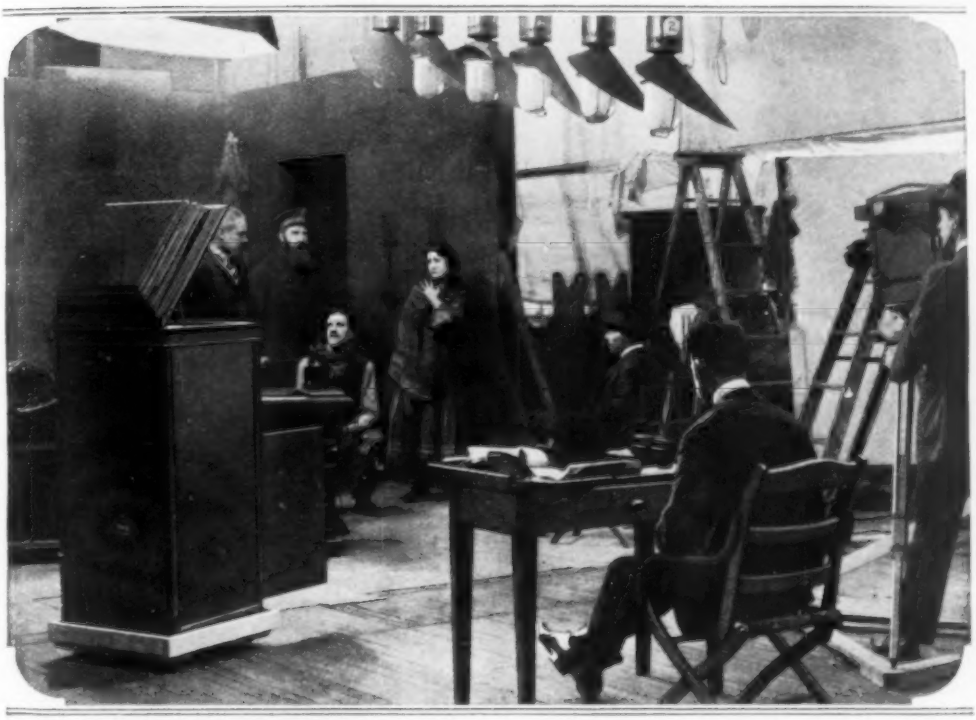
When Only Normal Timing is Required, as Many as 10,000 Photographs can be Printed in a Day with This Machine

MACHINE PLANTS THOUSANDS OF TREES IN DAY'S TIME

From 10,000 to 15,000 forest-tree seedlings are planted in a day's time with a machine now being used in New York State under the supervision of the Forest Service. Singularly, the apparatus was originally designed to facilitate the work of setting out tomato and cabbage plants. Experi-



Although Designed for Setting Out Cabbage and Tomato Plants, This Machine has been Found Very Useful for Handling Forest-Tree Seedlings



View of a Motion-Picture Studio Showing Phonograph on Which are Played Selections Designed to Put the Players into a Mood Appropriate to the Scene

ments, however, disclosed that it could also be used advantageously for placing seedlings, which by the hand method are planted at a rate of from 1,200 to 1,500 a day per man. The contrivance is of about the same proportions as a mowing machine and requires the services of three men and two horses. One man drives while the other two handle the seedlings. In operation, the machine makes a furrow into which the small trees are dropped at regular intervals governed by an automatic spacer. As this is done, a pair of rollers replace the dirt about the roots, which are mechanically supplied with water and fertilizer. A marker draws the line on which the next row of trees is to be planted as the machine travels along.

¶The experience of furniture makers in Grand Rapids, Mich., and in St. Louis, Mo., is said to prove that women are better and more reliable furniture finishers than men.

PHONOGRAPH PUTS MOVIE ACTORS IN RIGHT MOOD

Since moving pictures are so dependent on facial expression and the poses and motions of the body in telling a story, directors are eager to employ every means available to put players into the proper mood. In one motion-picture studio a phonograph is used in this connection, and selections are played on it which suggest and stimulate the emotions appropriate to the scene being presented. If, for example, a young woman in a scene is supposed to be wistful and sad and filled with thoughts of her far-away lover or her home, the director will have such a selection as "I Hear You Calling Me" played on the phonograph, which forms a part of the studio's equipment. The instrument has proven very helpful, particularly where actors enter scenes in which the relationship between their parts and the rest of the story is more or less unknown to them.

THIS remarkable photograph shows the wrecking of a great Zeppelin during a flight over England. The big airship was brought down by bombs thrown from the aeroplane shown high above. The death-dealing explosion occurred just as this view was taken from another aeroplane. The raid was a later one than that described by Mr. Freeman in the accompanying article. But no doubt Lieutenant Brandon, the airman-hero of this raid, felt much as did the other hero, Lieutenant Robinson, who said, "I was so pleased that, in my excitement, I pulled the 'joy-stick' and looped the loop several times." The Victoria Cross awarded Lieutenant Robinson was the first to be given for an act performed in England. The cross is conferred for merit of conspicuous bravery evinced by some signal act of valor or devotion to the country and performed in the presence of the enemy. The cross was instituted in 1856 and none of Britain's wars since then have touched English soil.

PHOTO BY PACH PHOTO NEWS, INC

WHAT DID THE CENSOR CUT?

$300 IN PRIZES

For the Most Intelligent Answer

THE following article by Lewis R. Freeman on a recent Zeppelin raid over England came to us in the usual mutilated condition after having passed through the hands of the censor. It is still a remarkable story, but leaders indicate the extensive cutting that has been done, and pique the curiosity. At a point indicated on page 808, twelve consecutive lines of manuscript, or about 140 words, were cut out. What did Mr. Freeman say that was of so great importance that the censor could not pass it? For the two best paragraphs replacing this censored one, Popular Mechanics Magazine offers the following cash prizes:

FIRST PRIZE $200
SECOND PRIZE $100

The answers will be submitted to a thoroughly qualified commission for decision as to their merit. The contest closes at midnight Dec. 31, 1916. The prize checks will be mailed the winners promptly, and the announcement of awards will appear in the magazine as soon thereafter as possible.

BRINGING DOWN A ZEPPELIN

By LEWIS R. FREEMAN

BY the calendar there is a few days' discrepancy, but by the moon it was just a year from the time of the first great Zeppelin raid on London to the—up to the moment of writing—record-breaking attempt of early September, 1916. By a most interesting coincidence it was my fortune to view both raids from precisely the same vantage point . . . and my opportunity for comparing the Zeppelin as master (as exemplified on the former occasion) and the Zeppelin mastered (as exemplified on the latter occasion) could not conceivably have been more favorable.

I have always thought of those arrogant, merciless low-flying airships of the first raid as sharks in their element, sharks nosing indolently around a helpless prey that was powerless to escape them. A year ago the raiders unquestionably knew to a nicety the weakness of London's embryo air defenses, and governed their action accordingly. Low as they came at that time—and it was probably very much under 5,000 feet—there is no doubt that they were never threatened for an instant by such batteries of nondescript artillery as could then be directed against them.

But the hunted thing which zigzagged in erratic flight across the . . . heavens [in the latest raid]*, relentlessly pursued by ordered searchlight beams and artillery fire, far from suggesting the coolly purposeful maneater in its element, called up rather the picture of a maverick leviathan that had been left by the receding tide in the reef-locked waters of a shallow lagoon and was being cornered by fishermen who were so sure of their game that they did not even try to hasten the harpooning.

The Zeppelin was a highly developed machine even at the outbreak of the war, while England's air defenses were practically nil. Naturally, therefore, there was room for a good deal more improvement in the latter than in the former. With swift-flying aeroplanes being brought down at the front at ten, twelve, and even—in several rare instances—at as high as thirteen thousand feet, it has been realized all along that it was only a question of time until England would be sprinkled with guns capable of hitting a Zeppelin—whenever it could be seen—at any height the latter could hope to ascend to, even after consuming half its petrol and discharging all of its five tons or more of bombs. The Germans, of course, have understood this as well as the English, and consequently their aim has been to build an airship that was capable of sustaining a lot of hitting without losing its buoyancy

* One word cut: probably "London." The bracketed words were inserted by the censor.

and control. How they have endeavored to accomplish this end is largely their own secret, but the general idea has been to give the engines as much protection as possible, to increase the number of ballonettes containing the inflammable "lifting" gas, and to surround the latter with a deeper outer envelope of noninflammable gas.

Unquestionably the Germans have in this way developed a machine capable of taking a great deal of punishment, both from guns and aeroplanes. England's problem, then, was to produce guns and gunners—a general system of defense, in fact—capable of inflicting more punishment than the Zeppelin could take. Also—and this was a very important consideration—there was the problem of tracing the movements of the raider, and—by means of searchlights—giving it sufficient visibility whenever it was desired to fire upon it. . . .

This is the place where 12 lines of manuscript, estimated at some 140 words, have been deleted by the censor, and for the replacing of which the prizes of $300, offered on page 807, are to be awarded.

Unless operating above heavy clouds —in which case it is "blind" itself—no searchlight is needed, even on the darkest night, to follow the movements of a body that blots out as many stars as does six or eight hundred feet of Zeppelin. . . .

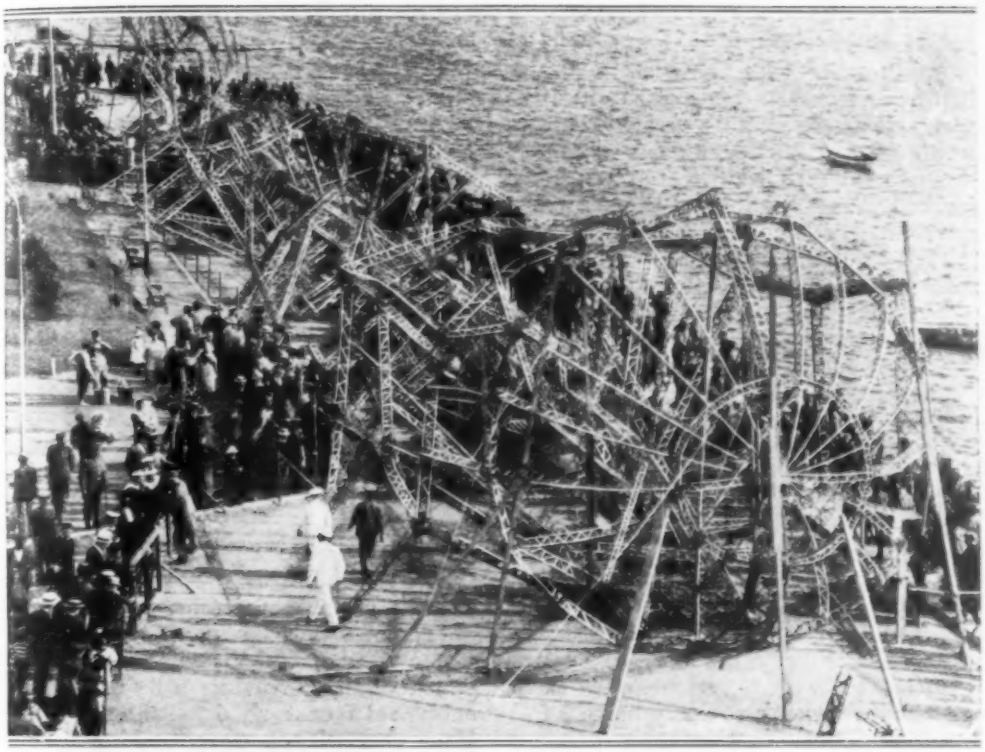
The honors—if one can use such a term in connection with Zeppelins—have been fairly evenly divided during this last year of development, with the scale beginning to incline more and more, however, in favor of the defense. As the guns have improved, they forced the raiders to fly higher and higher, with the result that the latter have dropped most of their bombs in a blind and large sort of way that did no damage whatever. On the other hand, the Zeppelins were showing their ability to take some very hard knocks — far harder than any one dreamed a year ago that dirigible bags full of inflammable gas could stand—and still have enough "kick" left to stagger home.

Through it all, however, to anyone following the game closely, and especially with any luck in being present when a duel was on, it was evident that the mastery was passing to the guns. With improving fire control, these, while rarely able to inflict a vital hurt, were repeatedly successful in making the raiders "quit," to scuttle their bombs—generally over a field or the sea—in order to get up and away from a spot that was becoming too hot for them. A half dozen times in the course of the last four months I have seen a Zeppelin, impaled on a single inexorable searchlight beam and "pocketed" with shrapnel flashes, draw back and scoot away, as a horse loses courage and refuses to take a hurdle. This was always on the outskirts [of the London area],‡ so that the real test was deferred until one of the airships in the last raid, either through losing its bearings or being forced to it by gun fire, "braved the barrier" and exposed itself to the surprises prepared beyond. From what I saw, I am convinced that it did not venture there by deliberate intention.

The general raid was the most ambitious yet undertaken over England, but of the thirteen airships participating in it, only three endeavored to operate . . . .§ Of these, two were forced to dump their bombs and withdraw, and the third—for reasons that can never be known — sailed straight across . . . Here a reception in preparation for many months awaited it. There was no indiscriminate slashing about of the lights, as in the raids of last year, but only a methodical searching by a score or so of them of what were doubtless definitely allotted areas of the overcast heavens. Flashes of guns and shrapnel were visible . . . before the Zeppelin itself appeared; also the blended rumble of what were probably hastily scuttled bombs.

The airship was flying very high—two or three times as high, it seemed to me, as those of the first raid—when a couple of searchlights waylaid it at the edge of a cloud, but even at an

‡ The brackets were inserted by the censor to indicate words to be cut out. They were overlooked.
§ Two words cut: probably "over London."



The Aluminum Framework of a Zeppelin Brought Down in Saloniki and Placed on Exhibition. This Is What Mr. Freeman Expected to Find When He Followed the Course of the Blazing Zeppelin in the Raid of September Second

altitude which was hardly less than 12,000 feet it appeared huge, certainly larger than any I had ever seen before. My glass was laid ready and I followed it closely. The ribs were less pronounced—for reasons I learned later—than those of other raiders I had seen, and the nose appeared to be much sharper. The gondolas—of which I am under the impression there were more than two—appeared to be almost entirely inclosed in the body of the ship itself.

At the point where it passed nearest to where I stood, a line to the airship made an angle of not more than 75° with the surface of the earth. As it was not heading so as to pass anywhere near overhead, I was able to watch it rather less distractedly than at a previous raid, when I had been looking nearly straight up and when the bombs were dropping within two hundred yards. This Zepp, it was very evident, did not want to drop bombs; in fact, it had probably dumped all, or nearly all, of its explosives already, and was trying to get away. Its speed was great but its course rather erratic, even before the firing began. As for its size, the length of my extended binoculars, held at arm's end, just about blotted it out. It was about as large as a 15,000-ton steamer would look at two miles.

The firing, when it began, was as ordered and methodical as the searchlight work had been. It seemed to come in one great salvo from the guns of a carefully determined area, to which the order had doubtless gone at the same instant. Even before it began, the airship had started emitting clouds of steam or gas in an endeavor to conceal itself, and to this must have been due the fact that a very small number of shell bursts—considering the guns in action—were visible. The

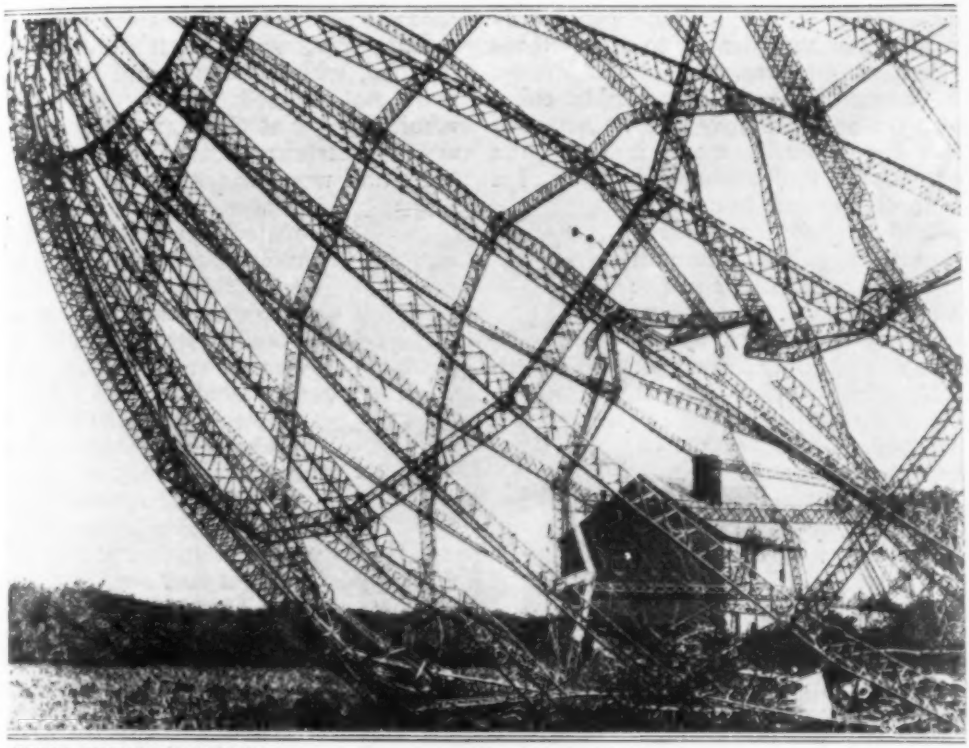
trailing white cloud was mottled with bright flashes inside it, however, and from the fact that these were above, below, and at both ends of the fugitive gas bag, there was no doubt that the latter was receiving its full share of the spiteful missiles directed at it. So far as I observed, none of the shots fell far short, or went wide to any great length, as had those of the early raids. The problem of ranging and hitting the Zeppelin had undoubtedly been solved; it was now a question of what effect the hits were going to have.

I did not time it, but my impression is that the sudden burst of firing did not continue longer than a minute or two. This fact, and the fact that the airship must have been well within range of many guns when the firing ceased, inclines me strongly to the belief that it was not a part of the plan to bring the raider down . . . but merely to disable it sufficiently to make it the easier prey for the aeroplanes that had been mustered to finish it as soon as it reached a region where its fall would inflict the least damage. . . . ||

Partly aided by its own swelling clouds of gas, partly by the lowering fringes of the shifting cumuli, the raider disappeared from sight four or five minutes after the firing ceased, but not before I had been able plainly to discern that there had already been some reduction in its altitude. Twice or thrice swift shadows cutting the shafts of wheeling searchlights had given sure hint of the aerial ambush preparing, and I was somewhat surprised that so much as nine or ten minutes elapsed before a quick red-yellow flash of light in the . . . sky told that the *coup de grace* had finally been given. For six or eight seconds this light spread—evidently inside the outer envelope—until the whole body of the Zeppelin was outlined in smoldering fire. Then there seemed to be a great explosion—though I heard no sound of it—a hot geyser of flame shot skyward and the frame of the airship upended and began to fall, throwing a light strong enough to cast shadows in the rosy glow that played over London. The

The Ruins of the Zeppelin Which Figured in the Raid of September Second. The Debris was Scattered over an Acre of Ground and There Was Little Metal in It, Seeming to Indicate a Serious Shortage in Construction Materials in Germany

|| Heavy cut.



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The Framework of a Super-Zeppelin Brought Down Three Weeks after the One Described by Mr. Freeman. There Was No Lack of Metal in This Craft. An Idea of Its Gigantic Size is Conveyed by the Proportions of the Farmhouse in the Background

sheet of flame seemed to have acted somewhat as a parachute, for it must have been between a minute and a half and two minutes before it struck the earth, considerably longer, I believe, than a dead weight of metal would have taken to descend 10,000 feet. When it reached the ground a great fan-shaped red glow played for a second or two, and then died out so completely that only the faintest blur of luminosity marked the spot on the . . . horizon where it had fallen. Probably 90 per cent of all that was combustible in this most modern of airships was consumed in the minute or two it was descending to the earth.

No one in London seemed to have any conception of the distance at which the raider had been brought down. People on the streets were speaking of it as being at Hampstead Heath, three miles away, and even the driver of a military ambulance mentioned a place which was only four miles distant. As a matter of fact it was a good 20 miles in an air line, and I covered a good deal more than that distance—partly by taxi but mostly on foot—before I arrived on the scene a couple of hours after daybreak. A small but hot fire had burned for some time, and water carried in buckets from the well of a near-by farmhouse had only just cooled off the wreckage sufficiently to allow the flying-corps men to begin their work of clearing it. Fifteen charred bodies of the crew had been removed and laid under a tarpaulin at a corner of the wreckage. The extremities of most of these had been burned off, and only two or three would have been recognizable. The stumps of the captain's hands were still on the steering wheel, and his teeth, behind shriveled lips, tightly set. Another man still gripped the lever of a ma-

chine gun, which he had been vainly working in an endeavor to drive off his relentless enemies.

To me the most remarkable thing was the astonishingly small amount of wreckage; hardly more, indeed, than one would find among the ruins of a burned wooden bungalow. I had expected to find a great dragonlike frame of aluminum—like that of the Zeppelin brought down at Saloniki — writhing across many hundred feet of field, where all there was in fact were some compact little engines—one of which less than a score of men were able to pick up and lift into a motor truck — the half of a big two-bladed propeller, some battered masses of metal which were once the gondolas, a couple of machine guns, a lot of tangled aluminum tubing, a few—a very few—copper pipes, the whole inextricably tangled in miles and miles of wire whose diameter was about one-sixteenth of an inch. The wire, fairly light and exceedingly tough, appeared to be not over half aluminum. Charred bits of a light wood, not dissimilar in grain to sycamore, were also plentiful. The wood had been cut in thicknesses of about an eighth of an inch, and glued together, three-ply and four-ply. The fact that it appeared to have stopped burning wherever it had fallen clear of the main mass of wreckage seemed to indicate that it had been subjected to some sort of fireproofing treatment.

The Allies have Learned Much about Aerial Defense since the Beginning of the War. This View Shows a British Cavalryman Firing upon an Enemy Airman with a Hotchkiss Gun

The whole area covered by the wreckage was less than an acre—not over 150 by 200 feet, I should say—and that there had been no great conflagration after it struck the earth was indicated by the fact that the leaves of a hedgerow, which some of it almost touched, while browned and shriveled, were not burned entirely off. The whole thing was eloquent of the shortage of certain metals in Germany. Wire and wood had taken the place of aluminum, and the changed construction which this had involved accounted for the less "ribby" effect I had noticed in the airship when I watched its flight with my glass. . . . Of the covering fabric I saw none, and think this must have been largely, if not entirely, consumed in the air.

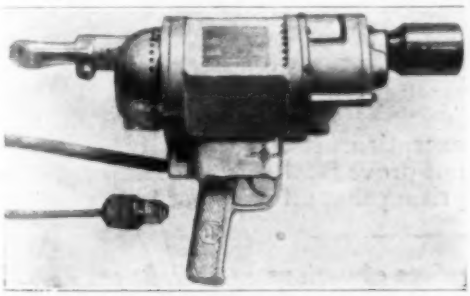
It was not officially admitted at the time of my visit to the wreck that the Zeppelin had been brought down from an aeroplane, and Lieutenant Robinson, with whom I chatted for a few minutes that morning was not, therefore, at liberty to speak of his exploit. Since the awarding of his V. C., however, he has made this brief statement regarding what transpired that night:

"I had been up something over an hour when I saw my first Zeppelin. She was flying high, and I followed her, climbing to get a position above. But there was a heavy fog and she escaped me. I attacked her at long range, but she made off before I could see if I had done any damage.

"The next ship I saw I determined I should attack from any position I found. I met her just after two o'clock, flying at 10,000 feet. Soon she appeared to catch fire in her forward petrol tank, the flames spreading rapidly along her body. She made off eastward on fire. In several minutes she dipped by the nose, and dived slowly, in flames, to the earth."

PORTABLE ELECTRIC DRILL HAS TRIGGER CONTROL

Trigger switch control and a pistol grip are two outstanding features of a new portable electric drill that has lately been introduced. The purpose of this arrangement is not alone to facilitate the handling of the tool, but also to reduce the breaking of small bits. The index finger of one hand controls the power, and since this enables the operator to turn on or off the current without loosening his grip, the likelihood of the instrument wavering or sagging slightly, things which often cause drills to snap, at such moments is lessened. The weight is distributed and the tool shaped so as to make it easy to employ when work must be done in corners or other difficult places. The motor is designed to

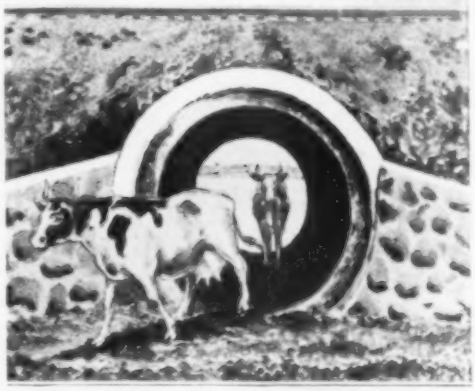


At All Times an Operator can Maintain a Steady, Unwavering "Aim," for the Trigger Switch Permits the Power to be Turned Off without Loosening or Changing One's Grip on the Instrument

be used on either direct or alternating-current circuits, while a forced-draft ventilating system enables a considerable overload to be carried without injury to the motor. The housing is cast of aluminum alloy.

CATTLE PASSES MADE OF CONCRETE PIPES

Instead of using culvert pipes for drainage only, a railway has installed a number of such pipes on its line between Minneapolis and Superior, Wis., which are large enough to serve as cattle passes. These new culverts are of reinforced concrete and are made in sections, 6 ft. 5 in. long. Each section is oval in shape, being 7 ft. 5 in. high and 7 ft. wide. A flat space, 2 ft. wide, serves as the bottom of the passageway. These pipes have been found fully as satisfactory as the

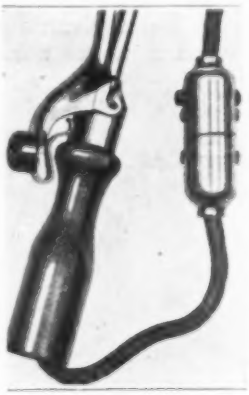


One of Several Large Culverts, Made of Oval Concrete Pipe, Which Serve as Cattle Passes under a Railway

arched or boxlike culverts which are commonly built where a pass for stock must be provided beneath an elevated track. The various sections of the pipe, after being placed, were cemented together.

SWIVEL JOINT FOR LIGHT CORD PREVENTS TWISTING

With a view to overcoming the annoyance and wear due to twisting of telephone or electric-light cords, a swivel joint has been invented which transmits the current through ball bearings. The principal parts in this swivel are two small porcelain cylinders, between which are two sets of balls. One set transmits the entering current and the other the return current. The parts are inclosed in a polished-metal case and can be inserted between the ends of a severed cord very quickly.



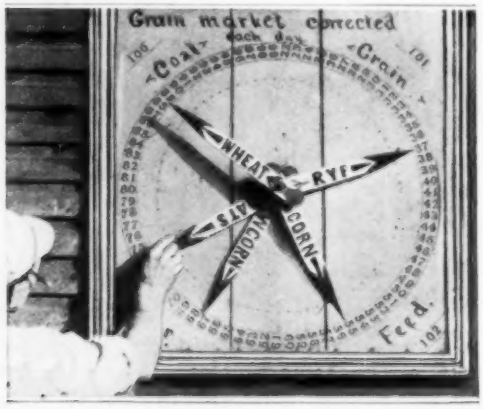
STREET CAR MAKES MAD RACE DOWN HILL

An Omaha street car, with its brakes broken and its controller damaged so that it was useless, recently carried its crew and four passengers down a long hill, a distance of 22 blocks, at a terrifying speed and finally crashed into a telephone pole. The unusual runaway was the result of having struck a load of lumber at the top of the hill. This collision smashed the front of the car so badly that the motorman had no control over the brakes or current. Fortunately there was little traffic on the street, as it was two o'clock in the morning when the accident happened. After being disabled the car gained momentum rapidly, and the passengers became panic-stricken, though none dared jump off. When it finally jumped the track it hit a telephone pole and rolled over twice. The car was reduced to a mass of wreckage and all on board sustained injuries, but with two exceptions, it was believed they would not prove fatal. It is considered surprising that all were not killed.

View of Wrecked Street Car After It had Run Uncontrolled for 22 Blocks down a Long Hill in Omaha

CLOCKLIKE DIAL SHOWS CURRENT GRAIN PRICES

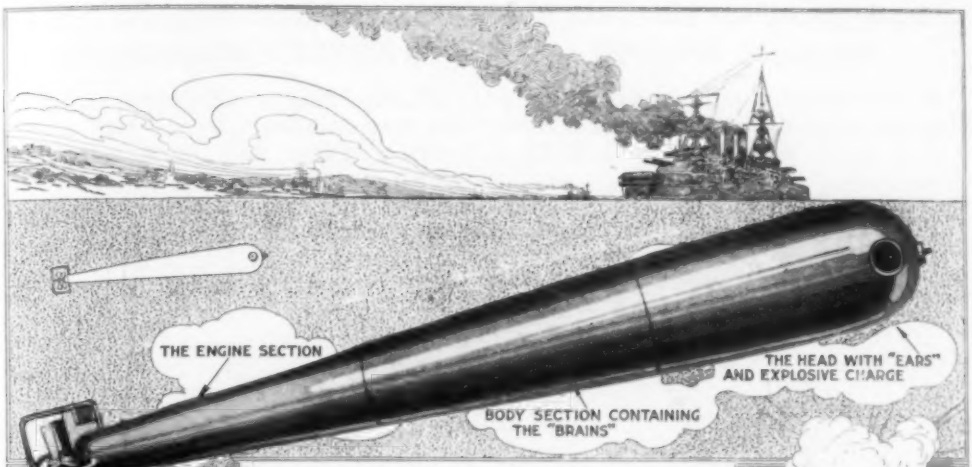
A Pennsylvania grain dealer has devised a novel means for posting the prices of various grains. It consists of a bulletin board, 3 by 4 ft., on which is painted a large circle resembling the face of a clock. Around the circumference are painted figures from 22 to 99, indicating cents per bushel. There are five wooden hands pivoted to the center of the dial, each of which is labeled with the name of a grain. Each day the hands are pointed to the proper prices and fastened in place by pins that penetrate through the hands into the dial. The bulletin board hangs outdoors so that all passers-by can see at a glance what the prevailing prices are.

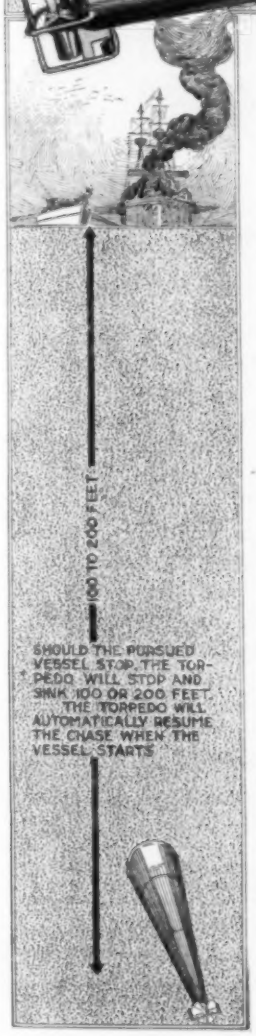


A Dial Erected by a Grain Dealer in Carlisle, Pennsylvania, on Which are Indicated the Current Grain Prices

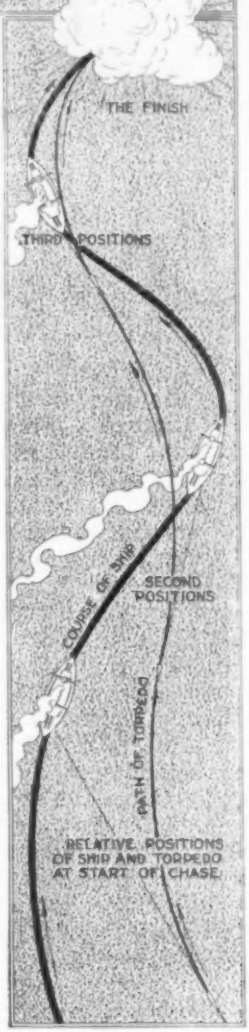
¶It has been proposed to discontinue a street-car line in a San Francisco suburb and use instead the new motor tractor having a passenger-carrying trailer which was described in Popular Mechanics Magazine for October.

VIBRATIONS OF ENEMY SHIP STEER NEW TORPEDO





Considerable notice has been given of late to a marine torpedo which is so constructed that its movements are guided by the sound waves issuing from the vessel serving as its target. The instrument is equipped with so-called mechanical ears. Before the weapon is launched, the latter are tuned to receive the vibrations produced by the specific craft that is the object of attack. With this relationship established, the torpedo's propeller whirls and the rudder adjusts itself so that the missile darts through the water at its enemy. Its speed is twice that of the fastest naval vessel, while any change in the enemy's course causes it to shift its direction of travel correspondingly. If its approach is observed and the engines of the vessel are stopped, the torpedo's propeller also ceases revolving and the instrument submerges safely out of reach. It ascends and continues the pursuit when the engines in the ship are again started. Thus escape from the weapon, even when it is sighted, seems highly difficult. Normally the torpedo would carry an 85-lb. charge of guncotton and strike the stern of a vessel, blowing a hole in its hull. By lessening the charge, however, it is claimed the weapon could be made merely to wreck the propellers and rudder of a vessel.



NEW TYPE OF CONCRETE COALING STATION

A southwestern railway has recently constructed a coaling station at West Tulsa, Okla., and another at Willow

Reinforced-Concrete Coaling Station of New and Pleasing Design

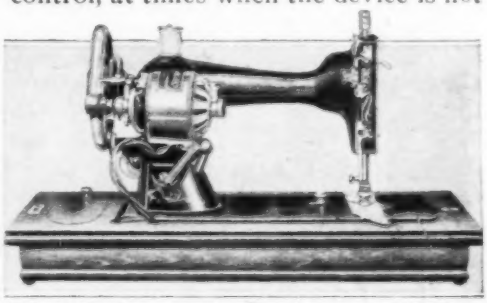
Springs, Mo., which are new in design and present a pleasing contrast to the common type of coaling station, which has a most forbidding appearance. The two stations resemble round towers and are of reinforced concrete. The larger one is 89 ft. high and 23 ft. in diameter. A large arched passageway for the cars is cut through its base. A coal car to be unloaded is placed in this passageway and its contents dumped into a concrete hopper directly beneath it. From the hopper the coal is raised by conveyors to a bin which occupies the upper 29 ft. of the station. The conveyors occupy two shafts that are built adjoining the wall, one on either side of the archway. Two discharging chutes are provided for coaling the engines. Each tower also contains a bin for sand, which, after being dried, is forced into it by compressed air. The larger tower has a capacity of 300 tons.

RECOMMENDS POTATO BREAD TO AMERICAN HOUSEWIVES

Potato bread is not alone a ration for the war-stricken peoples but also a very pleasing and nourishing food which any American housewife can prepare by using a recipe made up by the Department of Agriculture. It calls for 3 lb. of boiled and mashed potatoes and 2¼ lb. of wheat flour. Bread made with these materials has a rich brown crust, an appetizing odor, a very agreeable taste, and will keep fresh several days longer than ordinary bread. For communities which have an abundant potato crop it is recommended because it can be made at a reduced cost, but even where the price of potatoes does not make this kind of bread less expensive, it will be found a pleasing change in the family diet.

PORTABLE SEWING MACHINE IS MOTOR-DRIVEN

Compactness and portability are two of the convenient points incorporated in an electric sewing machine of a completely new design that has been developed lately. It seems to be especially suited for those who reside in city apartments, or cottages having but limited space. A housing is provided for the head and motor, which will also hold the rheostat and foot-operated control, at times when the device is not



This Motor-Driven Sewing Machine can be Placed on Any Table in the Home and Put Away on a Shelf or in a Drawer

in service. It may be used wherever there is an electric-light socket, and runs on either direct or alternating current.

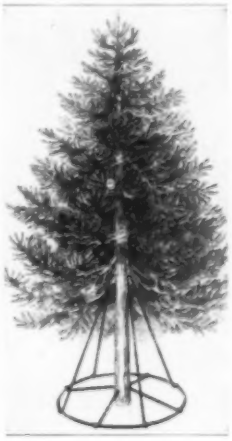
When the Street Cars Collided, Head On, the Old Bridge Gave Way, Crashing onto the Railway Tracks Below and Carrying Scores of Persons with It

CLEVELAND BRIDGE FALLS WHEN CARS CRASH

Two persons were killed and 50, or more, others injured at Cleveland recently when two street cars collided on the old West Third Street bridge and caused a section of it, spanning the Baltimore & Ohio Railroad tracks, to collapse. The crash occurred between north and south-bound Scranton Road carriers and resulted after the brakes of the latter refused to work, causing the car, which was crowded with women shoppers, to race down a hill, jump the track, and plunge with terrific force against the approaching car that had just reached the north end of the bridge. The impact was so great that the steel girders of the viaduct snapped, allowing the heavy structure to crash with a thundering roar onto the tracks below, carrying both street cars, their passengers, and a delivery wagon with it. Preliminary investigation of the disaster seemed to indicate that the trouble was caused by the loss of a nut off a brake rod on the south-bound car.

COLLAPSIBLE HOLDER FOR CHRISTMAS TREE

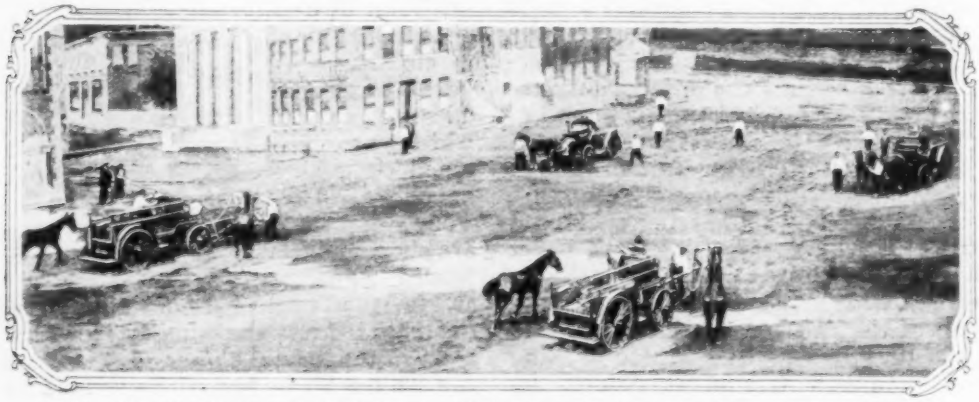
A wire Christmas-tree holder has been put on the market which is inexpensive and durable. It is capable of being stored in small space because it is collapsible, and so can be kept from year to year without inconvenience. It consists simply of a circular wire base, 20 in. in diameter, to which are fastened eight supporting rods. Four of these are short and are braced against and fastened to the base of the tree and the other four are similarly braced against the trunk higher up. A tree can be set up in one of these holders in a few minutes.



On the Left Is a View behind the Scenery, Showing the Tents Used by the Firemen. At the Right Are the Fire Zouaves being Inspected by the Fire Chief

FIREMEN GIVE THRILLING PAGEANT

A FEW weeks ago the firemen of St. Louis turned actors and, under the personal direction of their fire chief, presented an unusual production which the chief had written. The pageant, which was witnessed by a total of 40,000 persons, showed the firemen in several thrilling episodes and gave the audience a vivid idea of the manner in which various kinds of fire apparatus are used in real fires. About $6,000 was spent in laying out what appeared to be a city street, in an abandoned motordrome where the spectacle was presented. The background of the big stage was occupied by a store, hotel, bank, theater, etc., all erected in regular stagecraft fashion. The production opened with drills by the "Fire Zouaves," a company of firemen all of the same height, and by fire horses. There was also an exhibition of ladder climbing, and the proper handling of ropes and life nets. The thread of a love story ran through the scenes and furnished special interest in spectacular rescues. One fireman, cut off from escape in a burning structure, made a daring leap for his life. The burning of the stage buildings was made more real by the use of especially designed blowtorches, by means of which men behind the scenes occasionally filled the windows with flames. A special device was also used in making smoke, and large quantities of tar and pitch, together with excelsior, were scattered several feet back of the scenery and burned, to add to the effect. The spectacle was given for the benefit of a firemen's pension fund and netted the department about $24,000. A travesty on the firemen's efficiency examinations was an amusing feature.

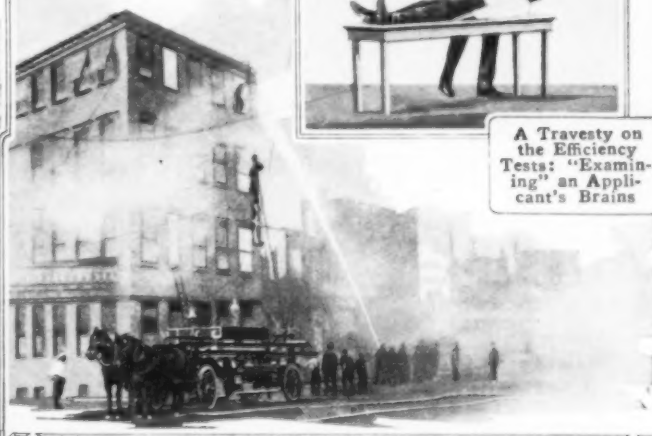


Drilling the Fire Horses: The Animals were Herded Together behind the Scenes, and at the Sound of Alarm Each Ran to Its Own Wagon without Hesitation

Fire Company Answering a False Alarm: As the Wagon Rounded the Corner One Fireman was Thrown Off. This Sort of Accident Costs the Lives of Many Firemen

A Rescue That Is Daring Even in a Play: Fireman Descending Taut Rope, Head First, and Bringing Two Exhausted Firemen with Him

A Travesty on the Efficiency Tests: "Examining" an Applicant's Brains



Acting Which Is Not without Real Peril: Flames in the Windows were Produced with the Aid of Special Blowtorches. Quantities of Pitch were Burned to Produce Dense Smoke

The Firemen Who Took the Principal Parts, and the Apparatus Used. The Young Woman Who Figured in the Love Story in the Play is Shown in Center of Group. The Fire Chief Is in the White Automobile

SCHOOLHOUSE MOVED DOWN SIDE OF STEEP HILL

A rather spectacular piece of house moving was accomplished in Los Angeles recently when the frame schoolhouse shown in the illustration was brought down from the top of a high hill to a street which is 300 ft. lower than the building's original site. The last step in the descent was to lift the structure over a 4-ft. retaining wall and deposit it in the street. Owing to the lay of the land it was necessary to tilt the building at a sharp angle to do this, but the task was finished without mishap. From this point in the street the schoolhouse was drawn two miles to a new site.

Moving a Los Angeles Schoolhouse from the Top of a Hill to a Street 300 Feet below the Original Site

NEW ROLLING MILL MAKES PLATES OF GREAT WIDTH

A rolling mill capable of producing finished plates 192 in. wide has recently been installed by an iron and steel company in Coatesville, Pa. The new mill will make plates as large as the present loading gauge of the American railways will permit. The rolls by which these large plates are produced are 17 ft. long and 34 in. in diameter. The largest rolls on the continent of Europe are said to be in a mill in Hungary and are 178 in. long.

CANADA'S "ROOKIES" STUDY MOVIES OF GERMAN ARMY

Canada's new recruits have been studying the German army with the aid of moving pictures. Since the outbreak of the war the censors have placed a ban on practically all German war pictures, but an exception has been made in the case of nine reels which were taken at the eastern front and show Von Hindenburg's army. These were first exhibited in Canada, in Camp Borden, under military auspices and were viewed by large numbers of "rookies." The pictures give the new recruits a very good idea of how the German soldiers look and act, and for that reason are considered of real value in the training camp. So interested were officials in securing these nine reels, it is said, that one of the battalions paid the duty on them.

LIFE BELT KEEPS WEARER UPRIGHT IN WATER

A new style of life preserver, recently patented, is designed to keep the wearer in an upright position in the water under all circumstances. It consists of an ordinary cork life belt to which is attached a combination breast piece and chin rest. These, like the belt, are made of cork, in sections, covered and hinged together by canvas. The chin piece is so attached to the upper part of the breast piece that it serves as a headrest and at the same

time allows the wearer to bend forward or backward. It can be seen that in cases of extreme exhaustion such a life preserver would keep the person wearing it in an erect position, without effort on his part.

OUR COTTON STANDARDS ADOPTED IN HOLLAND

The first foreign market to adopt the official cotton standards of the United States representing white cotton, which were laid down by the Secretary of Agriculture in August of this year, is the cotton exchange of Rotterdam, Holland. These new standards are now in use in all the important spot-cotton markets in this country. It is hoped that they will be adopted in all foreign markets as well, for such a step would prevent much misunderstanding between buyer and seller. The action of the Rotterdam exchange is considered an important step in winning general foreign approval for the new standards.

WEIGHTED HEAD BAND USED FOR DEVELOPING NECK

Persons who devote any attention whatever to their physical upbuilding usually realize the importance of intelligently exercising the muscles of the neck, in case they are undeveloped and weak. Such sports as football, boxing, and wrestling bring these muscles directly into use, so that almost always those who are really proficient in them are men with strong, powerful necks. One of our well-known athletes is the inventor of a neck exerciser that is intended for use in gymnasiums. It is also a thing which might easily be employed by the business man, youth, or girl who follows a program of morning exercise upon arising. The device is shaped like a large doughnut, fitted with a couple of crossed straps that permit it to be worn on the head, is made of leather—or some heavy fabric—and filled with shot. By wearing this while going through a series of neck exercises for a few minutes daily,

By Wearing the Device While Going through Proper Exercises, Muscular Development of the Neck is Effected

results manifest themselves before many months.

ELECTRIC SQUEEZER FOR ORANGES AND LEMONS

A time-saving device for use in restaurants, at soda fountains, and in other establishments requiring a large amount of juice from oranges and lemons, is an electric lemon squeezer, or reamer. Inclosed in a funnel-shaped guard is a ribbed cone, or knob, which is revolved by a small electric motor. When half a lemon or orange is pressed against the cone, it reams out the inside of the fruit without starting the oil of the rind. The guard catches the juice and it runs down through a spout provided at the lower side. It is claimed that the machine will procure 1 gal. more juice from a box of lemons than a hand squeezer, and that 300 lemons can be squeezed in 20 minutes.

PRESERVING MONUMENTS OF PAST FOR POSTERITY

Here and there efforts are occasionally made to preserve or restore some homely landmark of American progress. Sometimes it is a thing of national interest and historical importance, other times of provincial lore or local sentiment. In general, however, this tendency, slight as it is, to perpetuate the picturesque and tradition-bound monuments of past generations is worthy of encouragement, for it is partly in this way that America can hope to attain eventually an atmosphere and appeal that is more than temporary. The old is worth protection and perpetuation only when it is of value; but that value need not always be measured by the everlasting dollar. As commercial and industrial influences impress themselves upon our towns and villages, causing their development and modernization, all of the original tone and individuality of these places are likely to disappear unless guarded in one way or another.

These Views Show Different Sides of the Recently Constructed "Old Dutch Mill" at Roslyn, Long Island: It Is a Replica of a Structure That Stood on the Same Site during Washington's Life. The Wheel Shown in the Lower Picture Turns a Dynamo That Furnishes Electricity for Illuminating the Town Park

Two interesting, although not conspicuous, examples of this have lately come to attention. One is at Roslyn, L. I., where a replica of an old Dutch mill of Washington's period has been constructed to house a small hydroelectric plant. The other is a new railway station at Cooperstown, N. Y., which architecturally and otherwise is in keeping with the history and tradition of the place.

In the first case picturesque, historical, and utilitarian phases are represented. A citizen suggested the plan of reconstructing an old mill and utilizing the available water power by developing current and lighting the town park. This has been done, and a very interesting little

building, a careful reproduction of one formerly standing on the same site, erected. The cobblestones forming the ruined foundation of the original mill were made use of, as were other materials, whenever it was found possible to do so. When it came to roofing the structure it was desired to employ some durable material and at the same time obtain the effect of aged shingles. Cement ones, especially fashioned to resemble warped, weather-stained shingles, were used. The enterprise caused a local man who owned the only old Dutch mill still standing in that vicinity to turn the property over to the municipality. It contains the original machinery and will be utilized as a museum of local history.

Among the reasons why Cooperstown lays claim to distinction are that it was the home of James Fenimore Cooper and the birthplace of American baseball. These facts receive special recognition in a railway station recently completed there. Because much historic interest centers in the region, the railway company departed from its conventional type of depot and erected a structure suggestive of early days. It is a one-story stone building with a high-gabled roof and broad eaves that are supported on two sides by white columns. The interior is in keeping with the exterior, furniture of colonial style and pictures illustrating the "Leatherstocking Tales" having been provided.

A Large Stone Fireplace, Trophies of the Hunt, and Colonial Furniture Lend Color and Atmosphere to This Waiting Room in the Cooperstown Railway Station

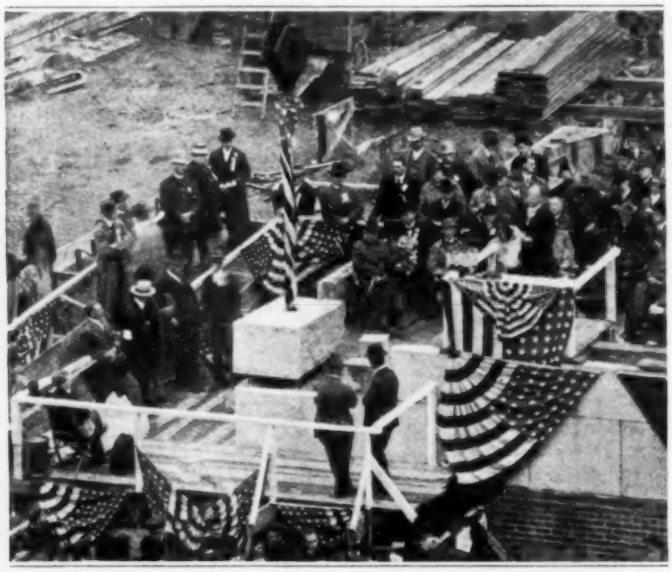
Not Only Is the Structure of Pleasing Architecture, but It Is in Keeping, Inside and Out, with the Historical Interest That Centers in the Little Community

This Shows the Structure as It Appears from the Village Side, a Little Wooded Hill at the Left Forming a Fresh, Green Background

Here are Grouped Paintings Illustrating the "Leatherstocking Tales," and Portraits of Cooper and of the Father of Baseball

CORNER STONE'S CONTENTS PREPARED SCIENTIFICALLY

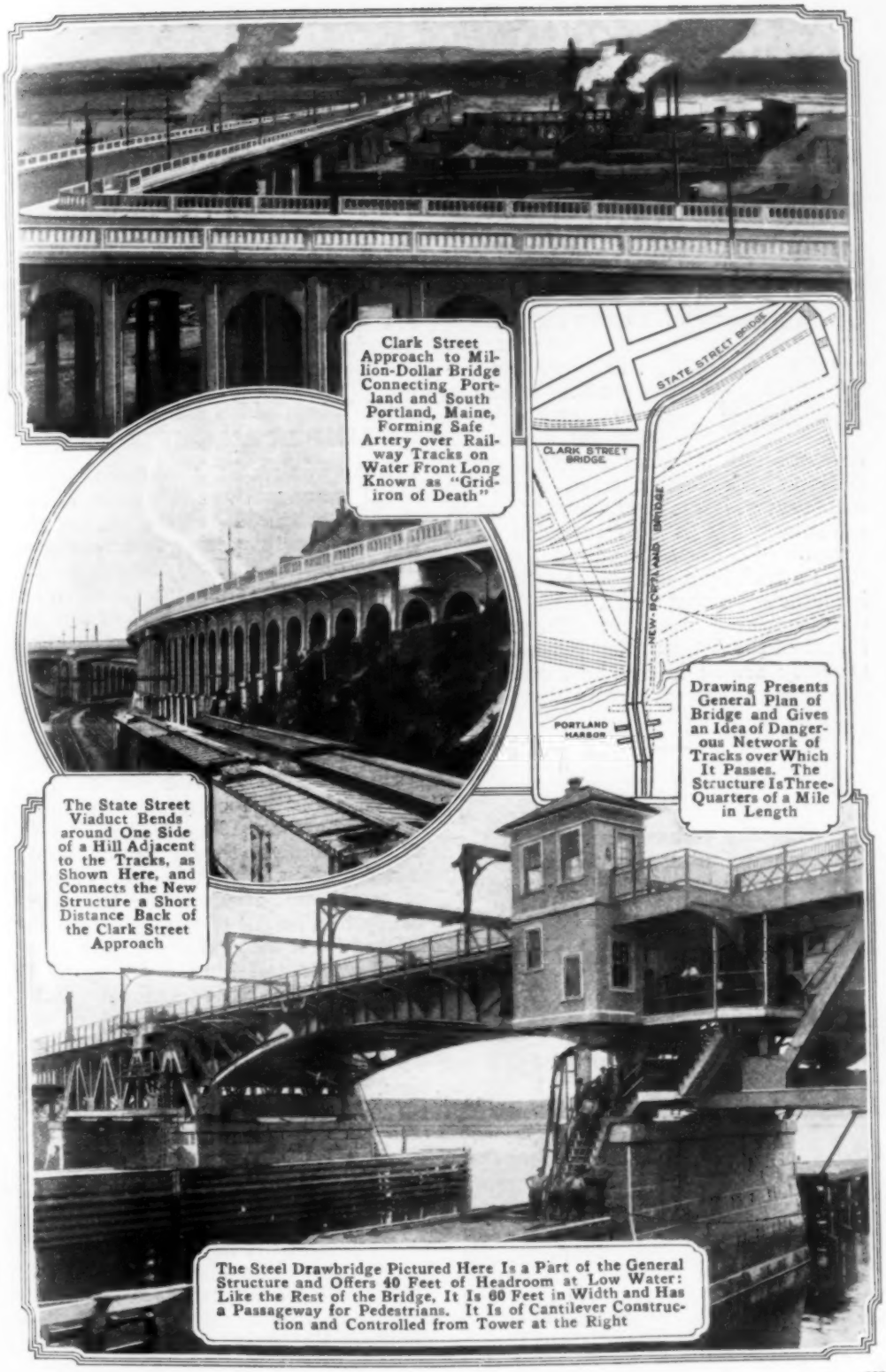
The badly decayed condition in which the contents of the old courthouse corner stone in Cincinnati was found when that building was abandoned, led the officials in charge of laying the new corner stone to take the utmost pains in their work. A bronze casket was made, measuring 12 by 12 by 18 in., with sweated joints and tight-fitting top. The box and various mementos to go in it were taken to a hospital sterilization plant and, after being locked in the sterilizing vault, were subjected to high steam pressure and then treated with formaldehyde. The box was then taken out and its contents arranged more compactly, after being wrapped in sterilized gauze. Thereupon the entire collection was again sterilized. The treatment was designed to remove moisture and destroy any life in the box. Then the latter was tightly closed and placed in a second strong casket, which was sealed hermetically. The whole was placed in a pocket in the under side of the corner stone. These unusual precautions were taken because the galvanized-iron box in the old corner stone had rusted away and all the paper articles, save a Bible, had fallen to pieces.



Laying the Corner Stone of the New Courthouse in Cincinnati: The Double Bronze Casket Which was Placed in the Stone, and Its Contents, were Sterilized Before the Box was Hermetically Sealed

NORTH AND SOUTH PORTLAND JOINED BY BRIDGE

After years of local agitation, the state, the county of Cumberland, and the terminal company whose tracks occupy the water front, have cooperated in the construction of a million-dollar bridge to serve as a connecting link for vehicle traffic between Portland and South Portland, Me. Work on the structure was commenced late in 1914 and completed during the middle part of last summer. It is now open to public travel and forms a safe artery over a dangerous maze of terminal tracks, constituting what in the past has been known at Portland as the "Gridiron of Death." The new bridge has two approaches on the Portland side and serves a busy commercial district. It is of steel and reinforced-concrete construction, three-fourths of a mile long, and 60 ft. in width. It crosses 25 railroad tracks, clears the street level by 25 ft., and includes a drawbridge which at low water provides 40 ft. of headroom. Fifty per cent of the cost of the structure was borne by the railroads, while, with the exception of $20,000 contributed by the state, the rest of the expense was defrayed by the county.



Clark Street Approach to Million-Dollar Bridge Connecting Portland and South Portland, Maine, Forming Safe Artery over Railway Tracks on Water Front Long Known as "Gridiron of Death"

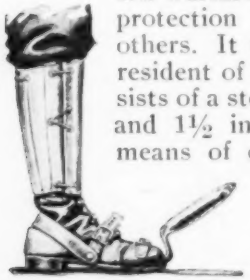
Drawing Presents General Plan of Bridge and Gives an Idea of Dangerous Network of Tracks over Which It Passes. The Structure Is Three-Quarters of a Mile in Length

The State Street Viaduct Bends around One Side of a Hill Adjacent to the Tracks, as Shown Here, and Connects the New Structure a Short Distance Back of the Clark Street Approach

The Steel Drawbridge Pictured Here Is a Part of the General Structure and Offers 40 Feet of Headroom at Low Water: Like the Rest of the Bridge, It Is 60 Feet in Width and Has a Passageway for Pedestrians. It Is of Cantilever Construction and Controlled from Tower at the Right

NEW TYPE OF BAYONET ATTACHES TO FOOT

The foot bayonet is one of the latest weapons to be devised for use in modern warfare, as well as for the protection of hunters and others. It was invented by a resident of Brooklyn and consists of a steel blade, 7 in. long and 1½ in. wide, which by means of clamps and straps can be attached in a very few seconds. It slants upward at a slight angle and so does not interfere seriously with walking. Especially when worn by cavalrymen, it can be employed to good advantage. It is also intended as a weapon of defense for a hunter in case of an attack by a wild beast. It is the inventor's idea that a man's kick is quite as powerful a means of offense as a thrust of the fist, and that if the foot is properly armed it can be made very effective. The weapon weighs a pound.



FARMERS PROTECT HORSES AGAINST BULL FLIES

During the summer months in the Canadian agricultural communities adjacent to Hudson and James bays, farmers are forced to swathe their horses in heavy cotton "overalls" to save them from the painful bites of big bull flies. These insects are very prevalent in the fields and make necessary the use of coverings that will protect practically all of an animal's body. As a rule the legs of a horse are left bare below the knees, but with this exception and that of his nose, he is fully clothed. The hood that fits over the head covers the ears and has small openings to accommodate the eyes. When robed in this way the horses are able to work without serious interference.

In Northern Canada Horses are Covered Almost Completely by "Overalls": Unless Protected in This Way, the Animals Suffer Severely from the Bites of Bull Flies

CLAMSHELLS BURNED FOR LIME IN AN EMERGENCY

Lime was recently secured in an unusual manner by a Mexican mining concern when its regular supply was cut off by a temporary interruption of transportation. The company was located near the seashore, on which had accumulated great piles of oyster and clamshells. These the natives had been accustomed to burn for lime and, after testing both kinds, it was decided to burn clamshells to meet the emergency, as they contained the larger percentage of lime. After some experimenting, a foundation of logs, placed about a foot apart, was made, covering a space 10 by 20 ft. On these a floor of firewood was spread and over it a 6 or 8-in. layer of shells. Layers of wood and shells were laid alternately to a height of 4 ft. The fire was lighted from the center with the aid of oiled waste and burned for about 24 hours, leaving little charcoal. After being allowed to cool a day, it was found that 10 tons of shells had produced about seven and one-half tons of lime. Two pounds of this lime were equal in strength to about one pound of good rock lime.

¶ It has been known for some time that electrolyzed sea water possesses antiseptic properties, and now the British have perfected an apparatus, which at small cost electrolyzes sea water on shipboard so that it can be used to disinfect the vessel.

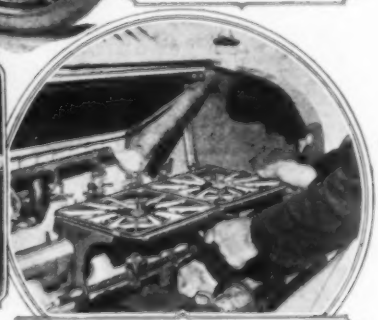
WESTERNER BUILDS DE LUXE MOTOR CAR FOR TOURING

Those who delight in spring and fall touring will become enthusiastic, no doubt, over the appointments of a "camping car" designed by a California motorist. The two-door body follows the lines of a yacht and is fitted with collapsible seats that can be laid flat almost instantly, forming a comfortable bed of sufficient size for two persons. Under the bonnet, and connected with the feed pipe extending to the carburetor, is a two-burner gasoline stove. In a trunk, attached to the running board on one side, there is an ingenious table, constructed like a roll top for a desk, which may be drawn out as needed and kept out of sight at other times. A low canopy top, which is strong enough to support the weight of luggage, covers the machine, and when the side curtains are attached, makes it as storm-proof as the cabin of a power boat, which it somewhat resembles. The sleeping, cooking, and dining equipment is all so artfully arranged that it is not noticeable except when in use. Were it not for the striking appearance of the body and its smart top, the car would attract no particular attention.

As Shown Above, the Seats in the "Camping Car," Pictured at the Left, may be Collapsed so as to Form a Comfortable Bed of Adequate Size for Two Persons. The Body and Appointments were Especially Designed by the Owner to Afford the Conveniences of a City Apartment on Long Tours

The Two-Door Streamline Body Has Almost the Lines of a Power Boat, an Appearance That is Somewhat Intensified by the Squatty Top, One-Piece Windshield, and Side Curtains with "Porthole" Windows

The Roller-Top Table is Concealed in a Trunk Mounted on One of the Running Boards



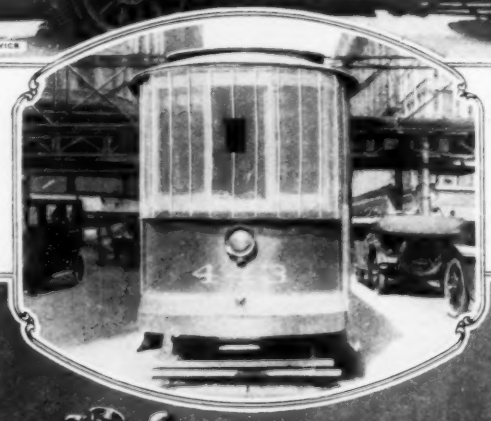
Hidden under the Bonnet Is a Two-Burner Gasoline Stove, Connected and Ready for Use. The Only Thing Lacking Is a Mechanical Cook Responsive to the Touch of a Button

CANADA MAY BUILD GREAT WAR-MEMORIAL HIGHWAY

A Canadian transcontinental highway, copied after the Lincoln Highway, has been proposed as a fitting memorial of Canada's part in the great war. The suggestion has come from the Military Hospitals Commission and has been forwarded to the government in the form of a resolution. This document points out that such a public work would offer employment for the large number of unskilled soldiers who will be suddenly thrown out of employment at the close of the war.

HOW POLICE AND PUBLIC MET THE EMERGENCY

One of the Many Motor Trucks Which were Called On to Render Unusual Service during the Street-Car Strike in New York City. This Truck with Its Big Load of Policemen is Hurrying to the Scene of a Disturbance

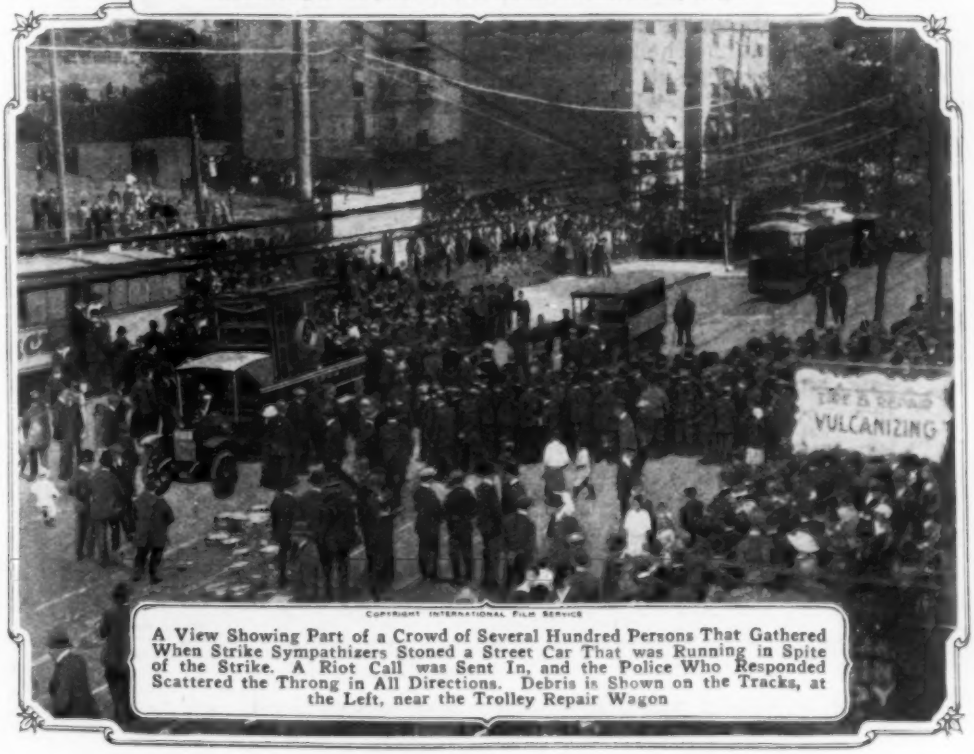


Some of the Street Cars Which were Operated during the Strike were Equipped with Very Heavy Screening, in the Manner Shown Here, to Protect the Motormen and Others in the Vestibules from Missiles That might be Hurled by Strikers

A Scene on One of the New York Piers, Showing the Emergency Sleeping Accommodations Provided for the Extra Force of Policemen, Who were Kept Close to Scenes of Possible Disturbance so That Help could be Obtained on an Instant's Notice, Day or Night

CAUSED BY NEW YORK'S STREET-CAR STRIKE

The Uncertainties of the Street-Car Service and the Risks Attendant on Riding in Some of the Cars, Created a Great Demand for All Sorts of Conveyances, Including the Mammoth Sight-Seeing Cars, One of Which is Shown Above. Doubtless the Conductor's Megaphone, Ordinarily Employed While Describing the Sights, Proved Useful in Announcing Stops



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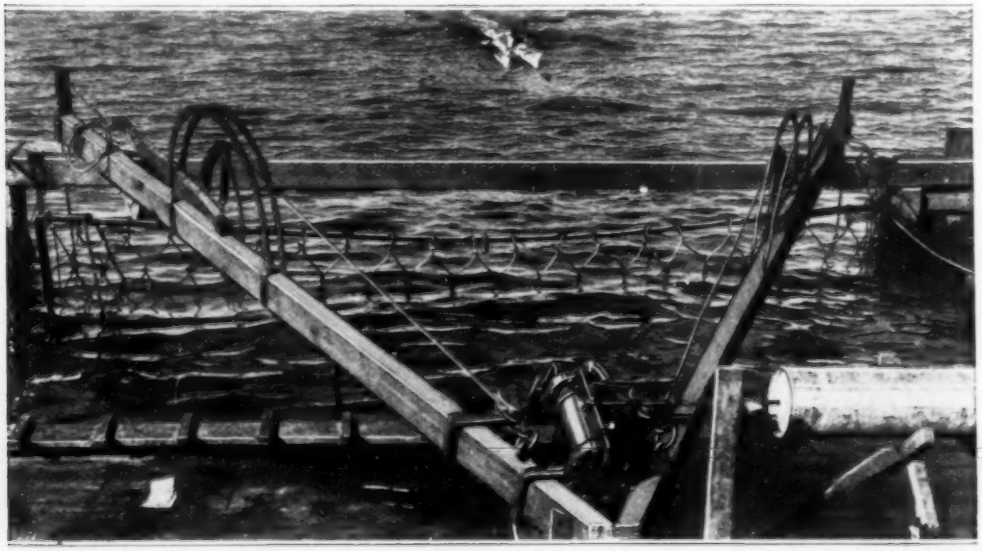
A View Showing Part of a Crowd of Several Hundred Persons That Gathered When Strike Sympathizers Stoned a Street Car That was Running in Spite of the Strike. A Riot Call was Sent In, and the Police Who Responded Scattered the Throng in All Directions. Debris is Shown on the Tracks, at the Left, near the Trolley Repair Wagon

FIREMEN'S GAS HELMETS HAVE NEW FEATURES

Gas helmets, possessing certain novel features and somewhat resembling those worn by European soldiers, have been furnished the firemen of Cincinnati to protect them against smoke and gas and also to shield their heads from falling objects. Air is supplied to the wearer of one of these helmets from a tank, which he carries on his back. By means of a hand pump the pressure in the tank can be raised to 200 lb. The crown of the headgear is strongly reinforced and is cushioned on the under side to lessen any shock caused by falling bricks, etc. The air flows from a tube just in front of the nose and the exhaled air passes out through lamb's-wool pads on the shoulders. The heavy glass eyepieces can be cleaned merely by turning a button. Special telephone earpieces are provided to enable the wearer to hear. In an emergency, a signal can be given by pressing a rubber bulb that blows a whistle to which it is attached.

MAY USE NETS TO PROTECT WARSHIPS FROM TORPEDOES

The Navy Department has been conducting experiments with a net for the battleship "Oklahoma" in an effort to determine the best form of such a device to be used as a protection against torpedoes. Thus it seems probable that the use of these wire barriers may once more become general, though they would necessarily have to be much stronger than those of the old type. The Navy Department has advertised for bids for a wire net made up of 16 units, each unit being 96 ft. long and 36 ft. deep. A defensive device of this character can be used when a vessel lies at anchor or when it is under way. In the latter case, however, the speed of the ship is reduced to four or five knots an hour. It is considered possible that these nets may prove so effective that they will materially lessen the value of torpedoes in warfare.



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Testing a Torpedo-Catching Net at the Newport Naval Station: Note the Torpedo at the Top of the Picture Speeding toward the Net, Which is Placed Far Enough Out to Render the Missile's Impact Harmless

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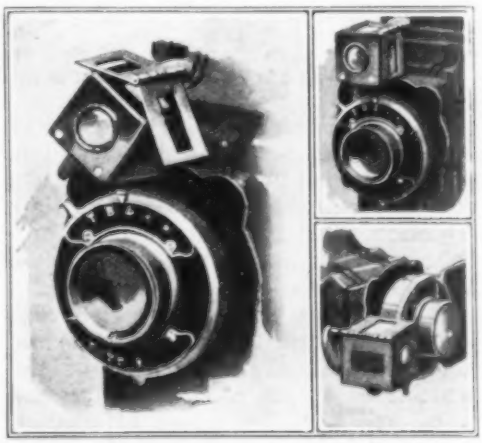
TORPEDO RACER UPSETS DURING SPEED CONTEST

IN making a turn while traveling at a terrific rate in the Astor cup race at Sheepshead Bay early in the fall, this machine leaped from the track, turned turtle, and landed in the field on its back. The picture shows the driver crawling out from beneath the car. He was only slightly injured, while his mechanician escaped practically without a scratch.

HANDY ACCESSORY IS MADE FOR CAMERA USER

Through the use of a simple little attachment that may be fitted to the reversible finder of a camera, an image shown on the ground glass, when either a vertical or horizontal picture is to be taken, is made to indicate precisely the view that will be reproduced upon the negative. The device, in other words, masks the finder so that a photographer does not see more of its area than he should, and therefore needs not make the usual compensations. The device consists of two metal leaves, hinged together and fastened to the finder. One member has a vertical, and the other a horizontal, opening. A small coil spring holds them at right angles to each other and tightly against two sides of the finder. In operation the latter is used in the ordinary manner, but is always masked by one of the leaves. Thus, when the finder is turned one or the other of the leaves automatically slides into place across the glass.



When the Finder is Changed from One Position to Another, the Vertical or Horizontal Slot Automatically Comes into Position on Top of the Finder as Shown at the Left

NEW DEVICE USED ON COAST TO STOP THEFT OF CARS

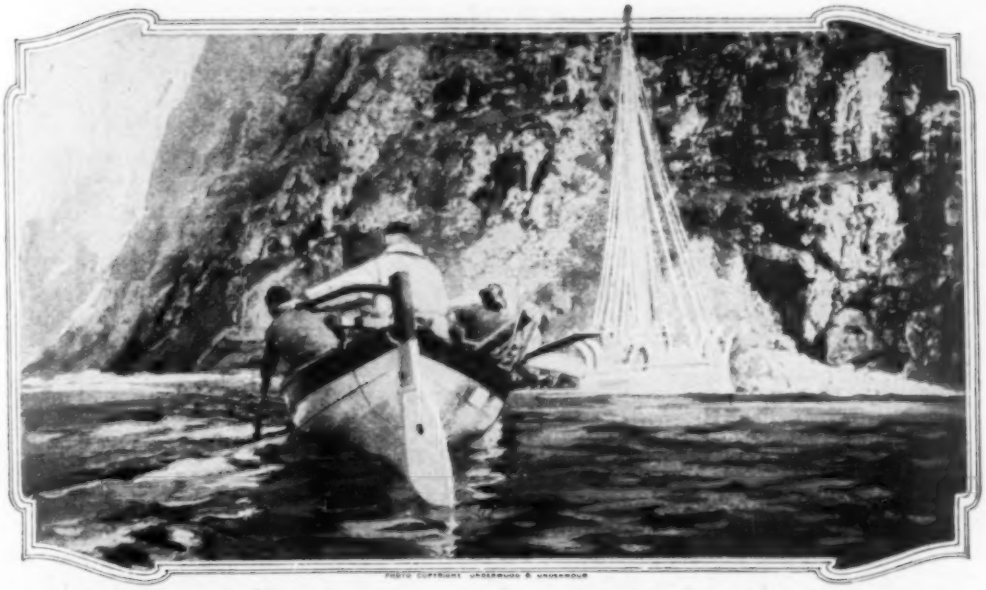
Quite a novel scheme of motor-car theft prevention is being tried out at Los Angeles, where a local inventor has designed a shackle that is intended to be secured tightly about the rim and tire of one of the wheels of a machine. The device is rather inconspicuous, is fitted with a high-grade lock, and tapers to a blunt point on the face. A car, with this contrivance attached to a wheel, cannot be driven along a street normally without attracting immediate attention, for the bumping is pronounced and the noise considerable. The spike also leaves its marks in a smooth-surface pavement or dirt road, forming a trail that may easily be followed. As a further part of the protective system, a standing reward is offered for the arrest of anyone caught driving a car thus equipped, and convicted of attempted theft. The device does not lock a car, but merely serves as a signal that under ordinary conditions would receive immediate attention.

The Shackle does Not Lock a Car against Movement, but Makes It Difficult for a Thief to Drive It Away Unnoticed

WIRELESS MEN INSURED BY EMPLOYERS GRATIS

The risks attendant upon being a wireless operator on board ship are compensated for in part, in so far as the employes of the Marconi Wireless Telegraph Company are concerned, by a free insurance arrangement which that company has established. All ship operators who have been in the employ of the company more than a year and less than five years are given $500 worth of life insurance, without cost, and all operators who have been employes more than five years are insured for $1,000. Those not eligible for life insurance are provided with a $500 accident policy free. A suitable allowance is also made for personal effects lost while on duty in storms or wrecks. The new arrangement is made in recognition of the heroism and loyalty of the men in the service. It is well known, of course, that the operator is practically the last man to leave a ship. The company has also agreed to hold open the positions of its employes who volunteer for United States military service, and can be spared, until Jan. 1, 1917, allowing them half pay until that date, when the matter will receive further attention.

The government's new eight-hour-day commission will begin its investigation of railway wages and working hours in Chicago, for it considers that city the best field for such study.



Pinnacle Rock, and Hard against It the "Great Bear," the Ill-Fated Schooner of the Borden-Lane Arctic Expedition. The Vessel Was on Its Maiden Voyage and Considered the Best Ice Ship Afloat

THE WRECK OF THE "GREAT BEAR"

An Interview with John Borden, a Robinson Crusoe Up to Date

REPOSING at the back of a broad, flat-topped mahogany desk in an inner office at Chicago, ticking rhythmically, is a big, round brass ship's clock. Emblazoned across its burnished dial in black letters are the words "Great Bear."

As the name suggests, the clock is a memento of the ill-fated three-masted schooner of the same name that carried the Borden-Lane expedition into the North and marooned its members upon a bleak, barren island in Bering Sea early last August. It will be recalled that the vessel, undoubtedly the stanchest ice ship afloat, was on its maiden voyage when, in the midst of darkness and fog, it crashed against Pinnacle Rock, a heart-sickening wreck. But it was a shipwreck de luxe; the castaways were Robinson Crusoes brought up to date.

While the ship's clock ticked slowly in his office, John Borden, Chicago millionaire sportsman, a few days ago sketched briefly the high lights of an unusual narrative, the story of a most eventful shipwreck.

"After leaving Unalaska for Nome, where we were to meet others of the party, we stopped at the Pribilof Islands," he began. "While with the government's resident naturalist there, one of the men came in with a bottle, washed up by the waves, that had a note within it supposedly written by a man who had been shipwrecked on St. Matthew Island, 215 miles north. That was but little out of our course to Nome, so we promised to investigate the matter, and set sail, hardly thinking that two days later we would be wrecked there ourselves, and then not find the man we hoped to rescue.

"After putting out we encountered dense fogs and fresh northerly winds. Observations, except in the nature of soundings, were impossible and we navigated by dead reckoning alone, expecting to arrive some miles west of St. Matthew at sunrise on the morning of August ninth. The currents played us false, however, and shortly before one o'clock a lookout shouted 'Hard-a-starboard!' A second later the 'Great Bear' hit a rock, slid over it,

and fetched up hard on another. We hauled in the canvas, but because of the darkness and fog could catch only occasional glimpses of breakers under our bow. By nine o'clock we had loaded our dory launch and four whaleboats, and put off for St. Matthew Island, which was visible some seven miles distant. About noon we found a beach where there was fresh water and driftwood. There we landed and pitched our four tents on sheltered ground some 200 yards from the surf.

"For the next 15 days this, a dismal patch of land in Bering Sea, absolutely treeless and covered only with thick reindeer moss and bunches of short tough grass, was our home. As quickly as things were landed and the camp pitched, we plastered the island with signal flags. At the bottom of each pole we left a note accurately describing the location of our headquarters.

"Then began the work of adjusting ourselves to the new environment and making ready for the worst. The 'Great Bear' rested on the rocks and held bountiful stores. Every day that the weather permitted we made trips to it and loaded the boats. All of these provisions had to be landed through the surf in the whaleboats, and sometimes it furnished us exciting moments that broke the monotony of work. In all we took ashore about 20 tons of supplies."

"What were your sensations after the excitement was over and you had time to realize that you were actually shipwrecked out of the lanes and might wait a year without sighting a mast?" he was asked.

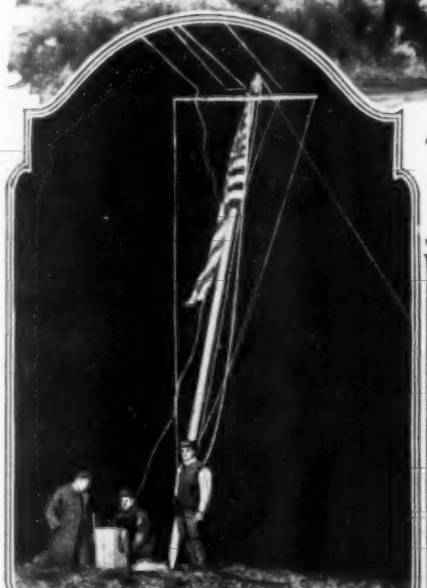
"I don't know, for I never thought of it before," he replied. "I think my chief sensation was that of profound disgust. I was indignant to think that we couldn't navigate any better than to hit the only rock in miles around. If you love a ship it makes you sick to see it go down.

"But if the whole thing had been planned out months ahead, we could not have been luckier castaways than Providence deigned to make us. In our two large tents were good stoves, and outside, coal enough to last for months. At night we read by the light of brilliant hydrocarbon lamps, and when we grew tired of other things we had Melba, Carolina White, and others sing to us; for among our trappings was a phonograph and a good assortment of records. The trout fishing was wonderful, and there was an abundance of plover. We had cameras along, too, even moving-picture ones, while food, clothing, blankets, and personal articles were adequate for our needs.

"The second day a storm tore down our tents. That amounted merely to inconvenience, for they were soon up again. But another episode happened at this time which came near proving what at that time, in view of our plans, would have seemed very serious. Since we were without a harbor and it was hard work to haul the 25-foot launch a safe distance onto the beach each time after using it, we conceived the bright idea of anchoring it about an eighth of a mile off shore beyond the breakers. After the storm had passed over, we found that the breakers were coming in from beyond the dory and that the latter was dragging its anchor and being dashed shoreward, stern first. Unless something was done the craft would be lost. With a couple of sailors I put out in one of the whaleboats. It was hard work handling the craft, and before it could be prevented, the sea hurled us with great force on top of the launch, smashing a hole through the whaleboat's hull. We got off again, but the sailors, who like most seamen couldn't swim a stroke, were panicky. It was up to me to jump into the water and cut the boat loose from its anchor. This enabled it to swing around sideways and drift in safely. But when I looked around, expecting to be picked up, I found that the scared sailors had pulled farther out and were making for a landing down the beach. I thought I could swim ashore readily enough, and started out. The temperature of the water was about 30°, however, and I soon began to grow numb.

Camp Established on St. Matthew Island Following the Wreck of the "Great Bear." For 15 Days This Was the Home of the Castaways. The Tents were Heated with Stoves and Lighted with High-Power Lamps. The Party Had Practically Everything That could be Desired, Except a Ship

Launching the Power Boat in the Surf, a Task That Always Meant Cold Baths for Some of the Men. Several Miles in the Distance, Faintly Outlined against the Drab Sky, is to be Seen Pinnacle Rock, Where the "Great Bear" Met Its Fate during Dense Fog and Darkness. Frequent Trips were Made Back to the Ship for Supplies



With Odds and Ends Taken from the Ship and Launch, One of the Party Constructed This Radio Plant. For Several Nights "S O S" Calls were Sent Out Regularly

At the Extreme Right, a Mere Spot in the Foaming Surf, Is the Figure of John Borden. He is Shown Completing His Icy Swim Ashore after Freeing the Launch from Its Anchor: One of the Thrilling Incidents That Occurred during the Stay at St. Matthew

I got in all right; it was merely a rather cold swim."

Mr. Borden, it may be well to recall, is a sportsman. His account of this incident is entirely devoid of the color and action given it by his sailors when they reached Seattle several weeks ago. The affair has endeared Borden to them and they look upon him as a game, fearless sportsman. They incidentally explain that he voluntarily did what he would not ask them to do, and then fought in freezing water against a treacherous undertow and won out.

Pulling Captain Lane onto the Lighter After He had Dived beneath It to Escape being Crushed by a Large Steamer on Opposite Side

All members of the party realized that it would be a miserable experience if circumstances forced them to winter on the island. "We felt sure we wouldn't have to do this," Mr. Borden stated, "but to play safe this contingency was considered in all our plans. Every hour of the day and night lookouts were on duty. N. H. Bokum, my personal guest, had no sooner set foot on the island than he surprised us by starting to construct a wireless plant. The 'Great Bear' was not equipped with radio instruments, but by putting odds and ends together Bokum built something, up on a hill above the camp, that looked all right and sputtered encouragingly. We all joked him about it, but he kept at work. Finally the thing was finished and he commenced sending out 'S O S' calls. There was no receiving apparatus and therefore no way of telling whether the signals were being heard. Every night, while the contrivance was still a novelty, he would take a lantern and, with several of us trailing along, go up the hill and tap away at the key, at intervals of a few minutes, for two or three hours. The atmosphere became very wet and he finally gave up, concluding conditions were not right for its operation.

"Capt. John Lane and I were making ready to go to Nome in the open launch. There was enough gasoline on hand to carry us halfway, and we expected to sail the rest of the distance, which altogether is a little less than 400 miles. We should have started by the 27th of the month, had not the coast-guard cutter 'McCulloch' picked us up two days before that.

"Another week on the island and we would have begun to feel our plight. Already the men were getting restless. Our Chinese cook, for instance, wanted to conserve the hams, so he served them only twice a week, filling in between times with trout and plover. Some of the sailors got ugly about it and a fight started in which knives played a conspicuous part. This was simply the first taste of what the winter would have brought.

"When we reached Nome, Captain Lane accidentally fell into the water from a lighter lying alongside the steamer 'Northwestern.' He swam under one corner of the scow, to escape the danger of being crushed between the vessels, and was pulled out."

According to another version Captain Lane fought desperately in the icy water and narrowly escaped a horrible death. Some one had presence of mind to wrap cotton about the stock of a gun and thrust it into the water on the opposite side of the lighter. With this to guide him he dived for the fourth time and swam beneath the scow to the free side, where he was rescued.

AERIAL TRAMWAY OVER NIAGARA WHIRLPOOL

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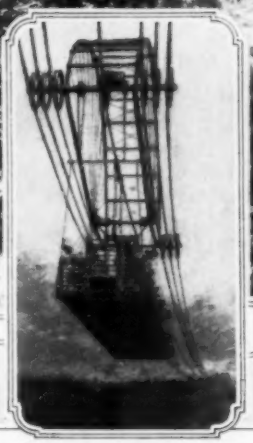
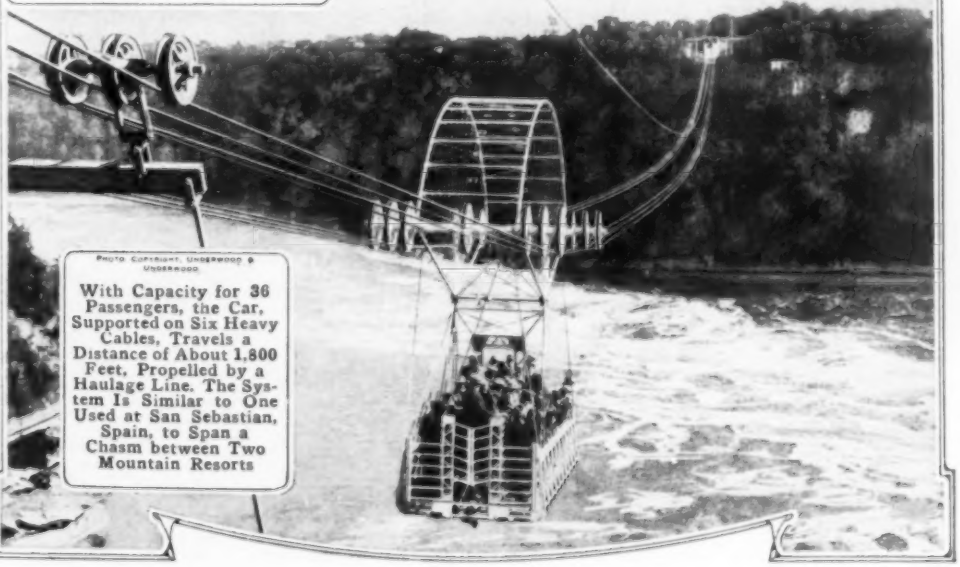
The Cables are Strung between the High Cliffs That Rise on Opposite Banks of the River. From the Car, Far above the Water, One Obtains a Splendid View of the Whirlpool on One Side and of the Rapids and Gorge on the Other. Niagara Falls Is Upstream, around the Bend, Far in the Background



Two Years Ago, When the Cableway was Assured, Popular Mechanics Magazine Published This Picture, Drawn from Blueprints. Compare It with the Actual Photograph of the Car Shown Below



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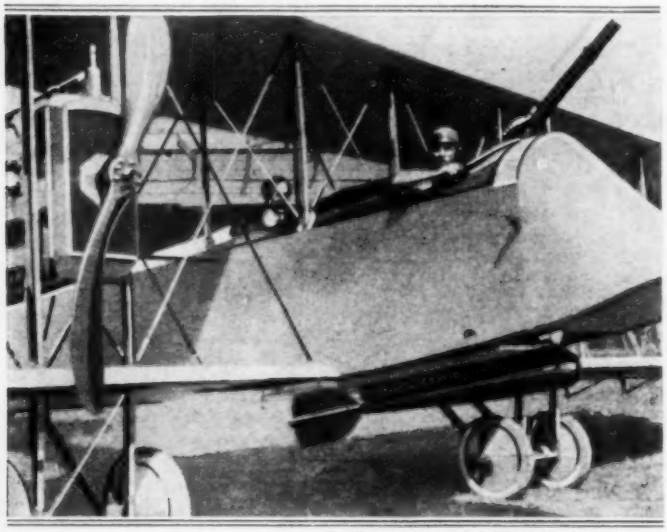
With Capacity for 36 Passengers, the Car, Supported on Six Heavy Cables, Travels a Distance of About 1,800 Feet, Propelled by a Haulage Line. The System Is Similar to One Used at San Sebastian, Spain, to Span a Chasm between Two Mountain Resorts

DEEP SECRECY COVERS TEST OF NEW AERIAL BOMB

During the last few weeks carefully guarded tests of a new aerial torpedo, which is rumored to be of tremendous military importance, have been conducted at an aviation field near Mineola, N. Y., before officials of the War Department. The weapon is about seven and a half feet in length, weighs 100 lb., and is designed to be launched from an aeroplane. It differs from other instruments of its kind particularly in that it is automatically timed to explode just before striking the earth, this permitting the force of its explosion to spread over a broad area instead of being largely spent against the ground. When in use it is attached to the under side of a craft in such a way that an observer can release it, by means of a lever, when flying over enemy territory. Before being launched, the torpedo is understood to be nonexplosive, but upon falling 300 ft., the timing device sets itself. The detonation, it is said, occurs at a certain height above the ground, irrespective of from what altitude the missile is dropped. The report of the army Ordnance Department states that "the aerial torpedo is satisfactory. The action is certain, the flight true, and the safety devices satisfactory." It was tested from heights ranging from 2,000 to 7,000 ft. with light charges, but even these shook buildings several miles away because of the force being exerted horizontally.



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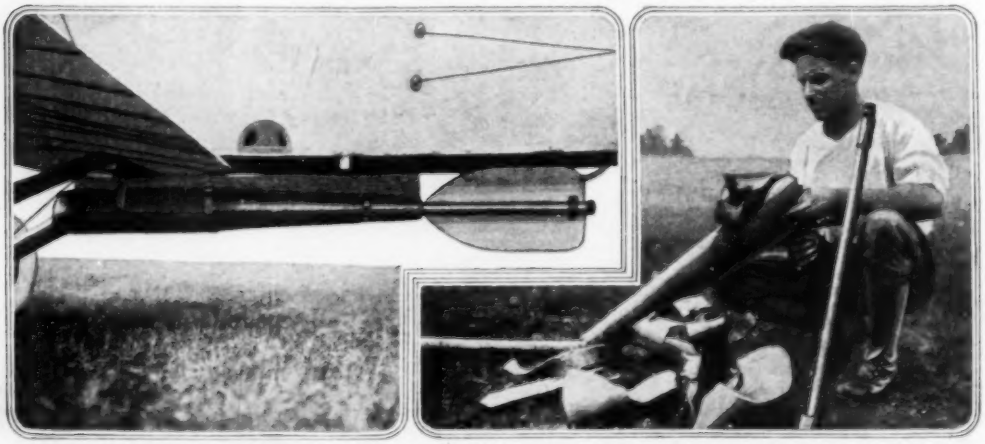
Showing the Remarkable Aerial Torpedo as It is Carried on the Under Side of an Aeroplane. Movement of a Lever Releases the Instrument and Causes It to Fly toward Whatever Point the Airman Desires



A Fairly Clear Idea of How the Torpedo is Attached to a Craft is Afforded by the Close-Up View at the Left. The Twisted Remnants of the Casing of an Exploded Bomb are Pictured at the Right

With Every Appearance of Being an Expensive Residence, This Building is Used as a Grocery Store

"OFF-THE-TRAY" LUNCHEONS FOR RAILWAY TRAVELERS

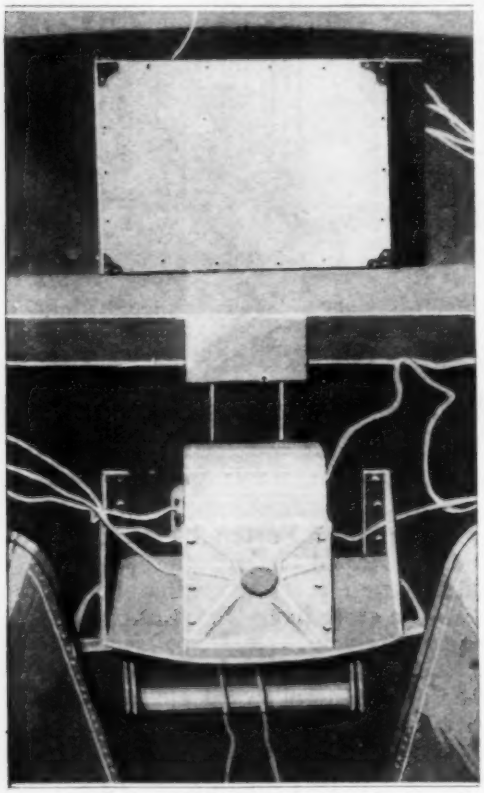
For the benefit of persons making extended railway journeys, who wish to procure their meals at less cost than dining-car rates permit, a western railroad has inaugurated what it calls an "off-the-tray" service. Waiters pass through the tourist cars and chair cars bearing large trays laden with many kinds of sandwiches, fruits, hot coffee, milk, pies, cakes, etc. It is expected that this service will be especially appreciated by women traveling with small children, and by those who would like to supplement their lunches with a hot drink or a dessert.

RESIDENCE SECTION BOASTS MODEL GROCERY STORE

Outlying residential districts in scores of cities are continually being marred by the encroachment of business houses. Since the matter has become a problem that is being given considerable study, it is interesting to observe how a Portland, Ore., groceryman escaped being the object of indignation meetings when he established a store in the heart of one of the most exclusive residence sections of that city. He erected a building which has all of the outward appearances of being an expensive home, and one that compares favorably with the houses adjacent to it. The structure, which is of colonial architecture, is finished in stucco and set back 30 ft. from the sidewalk. A broad veranda, shrubs, box plants, and a well-kept lawn give it a very attractive appearance. The windows, which are arranged like those of a dwelling, are tastefully curtained instead of being used for display purposes. Except for a small sign, inconspicuously hung, one would not suspect that the building was employed as a store. The interior has a large log fireplace, comfortable seats for patrons, and a bubbling fountain. All goods are received and dispatched at the rear, which is kept as clean as the back of the ordinary residence. This is one way of lessening the objections to the neighborhood store.

NEW AIR-CRAFT STABILIZER BELIEVED IMPORTANT

Tests conducted at Hempstead, L. I., before government officials, army officers, and representatives of the Aero



The Details of the New Stabilizer have been Kept Secret, but It is Known That Its Action is Not Governed by a Gyroscope

Club of America have caused considerable importance to be linked with the invention by a Chicagoan of an electric aeroplane stabilizer. The technical details of the apparatus have been kept secret and little is publicly known about it except what was made apparent during its demonstration. It is very compact and weighs only 19½ lb. in its present form. Its size, lightness, and the fact that it can be manufactured at moderate cost are points which are materially in its favor. Those who witnessed the Hempstead tests also made flights in the military tractor to which the mechanism has been applied, and according to reports were deeply impressed by what they saw and experienced. The instrument acts automatically, almost instantly forcing an aeroplane into the correct position of safe flight as it encounters changed conditions in the air.

WATERPROOF HUGE DAM IN NOVEL MANNER

As the level of the water behind the Elephant Butte dam was slowly rising, the upstream surface of the dam was waterproofed with cement in a novel manner. Workmen stationed on a raft applied the various coats of mortar with a cement gun, doing strips about 10 ft. high and as long as the dam at the water level. Before applying the cement, however, the surface was cleaned with scrapers and wire brushes, and then roughened with a sand blast. Immediately before applying the cement the surface is wet. Four layers were put on in this manner, each being about ¼ in. thick. It was found that if the coating was made thicker than this on the vertical wall, it would slough off before setting. Each succeeding layer was applied before the one preceding it had attained its final set so that perfect adhesion of the four coats would be secured.

CLUB PERFORMS SERVICES OF VALET AT LOW COST

In both New York and Chicago unusual down-town clubs for men have been established that render a variety of personal services for their members at a nominal cost. This is covered by dues which are payable quarterly, semiannually, or annually, in advance. For approximately seven cents a day a member may have his clothes dry-cleaned and pressed, and his shoes shined, and in addition he has the use of shower baths, a private locker, a dressing room, and other facilities of a first-class club, including a richly furnished rest room. No tipping is allowed. The Chicago club has about 600 members.

HYDROPLANE SETS NEW WORLD'S RECORDS

THIS 20-ft. hydroplane, the "Miss Minneapolis," created a sensation in the Gold Challenge Cup race in Detroit a few weeks ago by traveling at such speed that it broke more than one world's record for crafts of its class, thus winning the cup. One of these was the mile trial record, the mile being covered six times at an average speed of 1 min. 7 3/5 sec., which is at the rate of 53.25 knots, or 61.24 miles an hour. Another record was broken when it covered one five-mile lap (nautical miles) in 6 min. 11 sec., which is at the rate of 55.8 statute miles an hour.

PASSENGERS KEPT UNAWARE OF FIRE IN SHIP'S HOLD

Fire of unknown origin broke out on the steamship "Philadelphia" while in mid-ocean on a recent voyage from Liverpool to New York, and was fought by the crew for four days, though the majority of the passengers were ignorant of the fact. Four days before reaching port an officer saw wisps of smoke on the main deck, and, on opening a hatch, clouds of smoke rolled out. Realizing that a panic might be started if the fire was discovered by the passengers, and not desiring to feed the flames with fresh air, he quickly closed the hatch. Holes were then bored in the steel walls of the storage compartment where the fire was. Through these jets of water and live steam were poured almost constantly. Whenever they were discontinued the flames grew hotter, and so the fight was kept up all the way to port, where the ship was docked.

BELT USED TO FINISH CONCRETE ROAD

Experiments have been made lately in various parts of the country in finishing the surface of concrete roads by drawing a belt across the top, the object being to give the road a uniform finish. Heavy belting and also canvas have been used for this purpose. In the case of belting, a strip about 10 inches wide and 2 ft. longer than the width of the road is laid down, crosswise of the street. Workmen standing at either end draw the belt back and forth, gradually working it forward in a seesaw fashion, soon after the template has been removed. After the water has disappeared from the surface the process is repeated, and in some cases a third treatment is given after the concrete has begun to stiffen. This produces a uniform coarse-grained texture, without the depressions which almost invariably are produced by hand-floating.

CITY OF VERDUN DECORATED BY ALLIED RULERS

Verdun, the city which for months bore unflinchingly the brunt of the terrific German offensive in the western theater, has been decorated by France and its allies. This extremely unusual, if not unique, honor was conferred upon the town as a tribute to its defenders in which all might share. The idea was proposed by the czar of Russia some time ago. During the simple, impressive ceremony, which was attended by the Generals Joffre, Petain, Nivelle, and Dubois, the representatives of the city, the department, and the military missions of the allies, President Poincaré eulogized the town and those who fought for it by saying, in part, that "Verdun represents henceforth what is finest and purest and best in the French spirit. It has become a synonym for patriotism, bravery, and self-sacrifice." He then pinned each of the several crosses, awarded to the town by the rulers of the allied nations, upon a cushion which was presented to the mayor. The medals consist of the Russian Cross of St. George, the British Military Cross, the Italian Gold Medal for Military Valor, the Belgian Cross of Leopold, the Serbian Gold Cross for Military Bravery, the Montenegrin Obilitch Gold Medal, the Cross of the Legion of Honor, and the French War Cross. The emperor of Japan has also awarded a sword of honor.

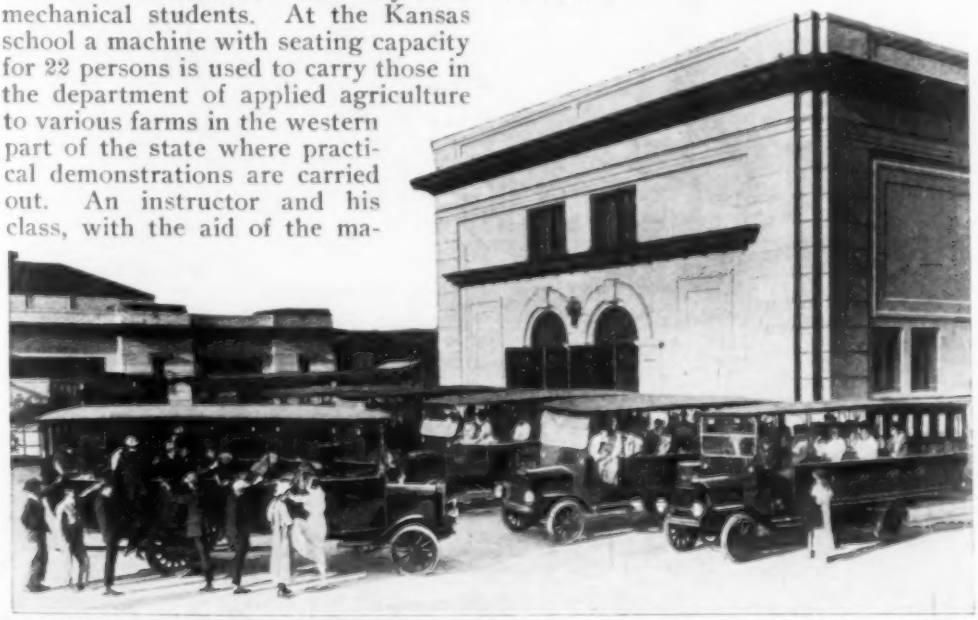
The Decorations Recently Presented to the City of Verdun by President Poincaré on Behalf of France and the Sovereigns of the Allied Nations

SCHOOLS OPERATE OWN MOTOR-BUS LINES

Motor busses are being employed to meet the transportation problems encountered at the Fullerton, Calif., high school and the Fort Hays, Kans., state normal school. In revising the educational system at the former place some time ago, the courses were broadened, a group of splendid buildings erected, and a special district created to include two adjoining towns. In order, then, to handle the transportation question, which the change in the school's territory developed, a fleet of motor busses was procured as a part of the institution's regular equipment. Routes ra-

This Vehicle, Owned by the Kansas State Normal School, Makes It Possible for Classes in Applied Agriculture to Study Crop Conditions at First Hand

diating in different directions for distances of 10 or 12 miles were established. Pupils residing near the ends of these lines and enrolled in the finishing class of the manual-arts department were engaged as chauffeurs. Half of those attending the school use the busses in going to and from it, while the maintenance and repair of the cars is looked after by the mechanical students. At the Kansas school a machine with seating capacity for 22 persons is used to carry those in the department of applied agriculture to various farms in the western part of the state where practical demonstrations are carried out. An instructor and his class, with the aid of the machine, make frequent visits to farms, study actual crop conditions, and carry on experiments during different parts of the season. In the past the class made all such excursions by rail. The acquisition of the machine has not only made many more farms accessible, but has greatly reduced transportation costs and time consumption for the students.



Fleet of Motor Busses Operated by Fullerton, California, High School being Loaded for Daily Homeward Trip

AIRMEN HUNT U-BOAT OFF ATLANTIC COAST

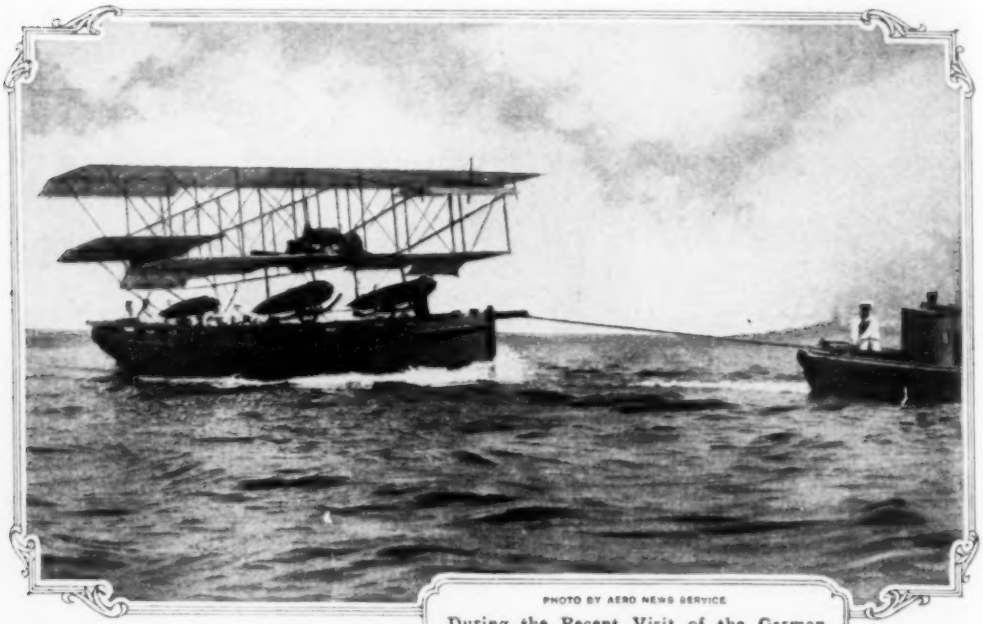
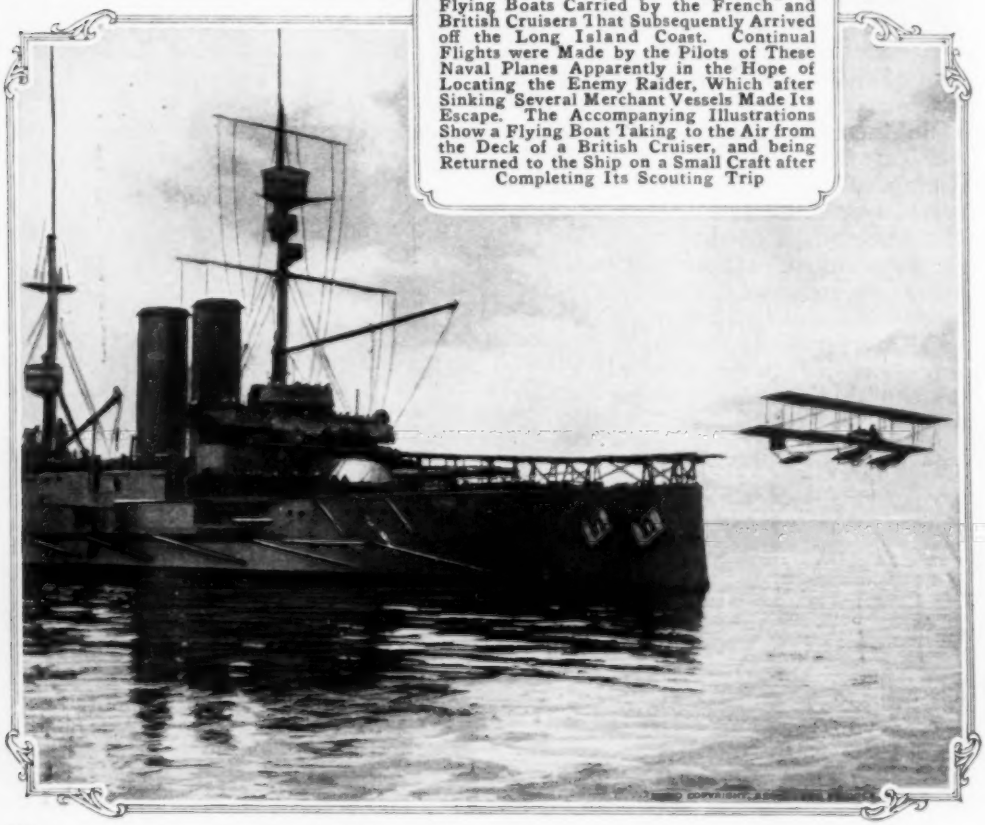
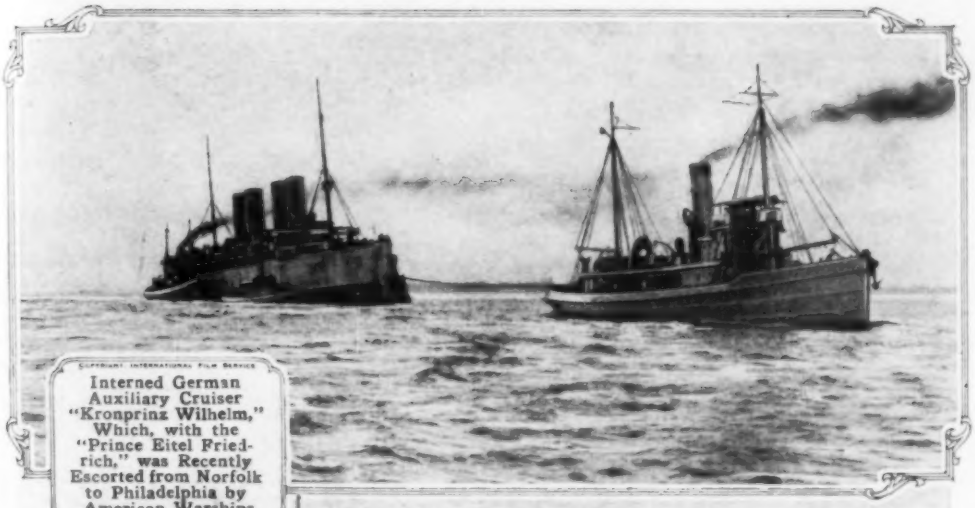


PHOTO BY AERO NEWS SERVICE

During the Recent Visit of the German Submarine "U 53" to American Waters, There Was Considerable Activity among the Flying Boats Carried by the French and British Cruisers That Subsequently Arrived off the Long Island Coast. Continual Flights were Made by the Pilots of These Naval Planes Apparently in the Hope of Locating the Enemy Raider, Which after Sinking Several Merchant Vessels Made Its Escape. The Accompanying Illustrations Show a Flying Boat Taking to the Air from the Deck of a British Cruiser, and being Returned to the Ship on a Small Craft after Completing Its Scouting Trip



GERMAN WAR SUBMARINE VISITS NEWPORT



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Interned German Auxiliary Cruiser "Kronprinz Wilhelm," Which, with the "Prince Eitel Friedrich," was Recently Escorted from Norfolk to Philadelphia by American Warships

PHOTO COPYRIGHT, WATERMAN

The German Under-Sea Fighter "U 53" Lying at Anchor in the Harbor at Newport, Rhode Island, during Its Unexpected Visit to American Waters a Few Weeks Ago

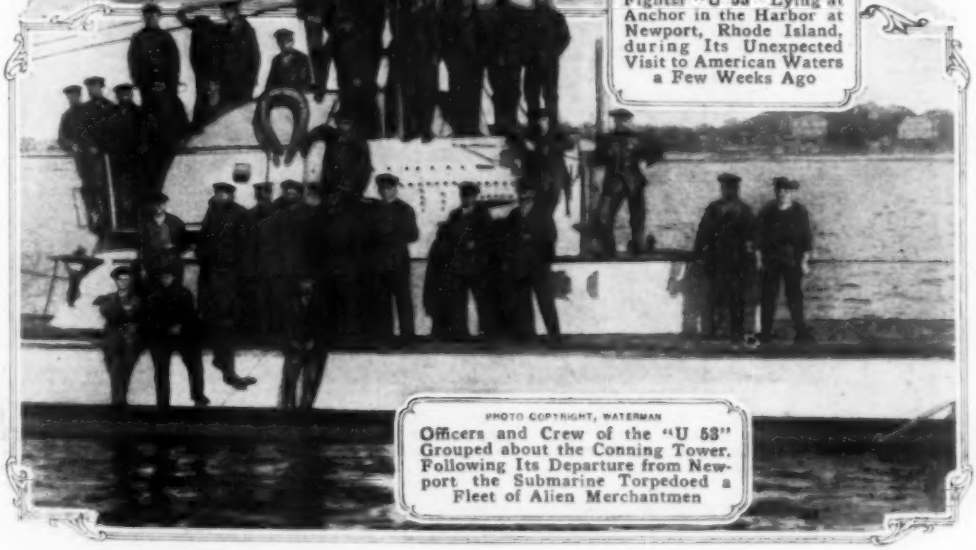
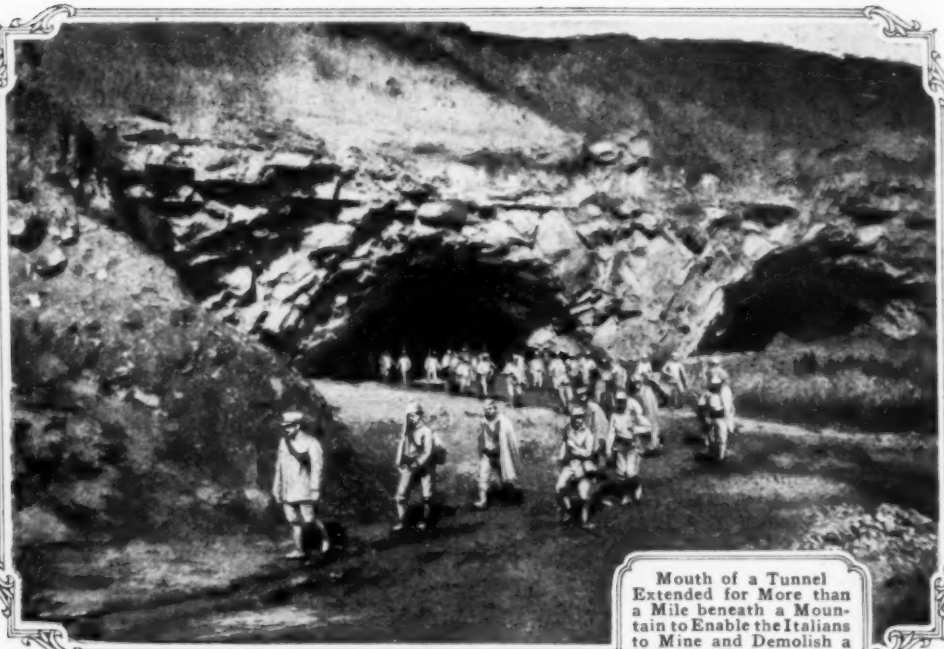


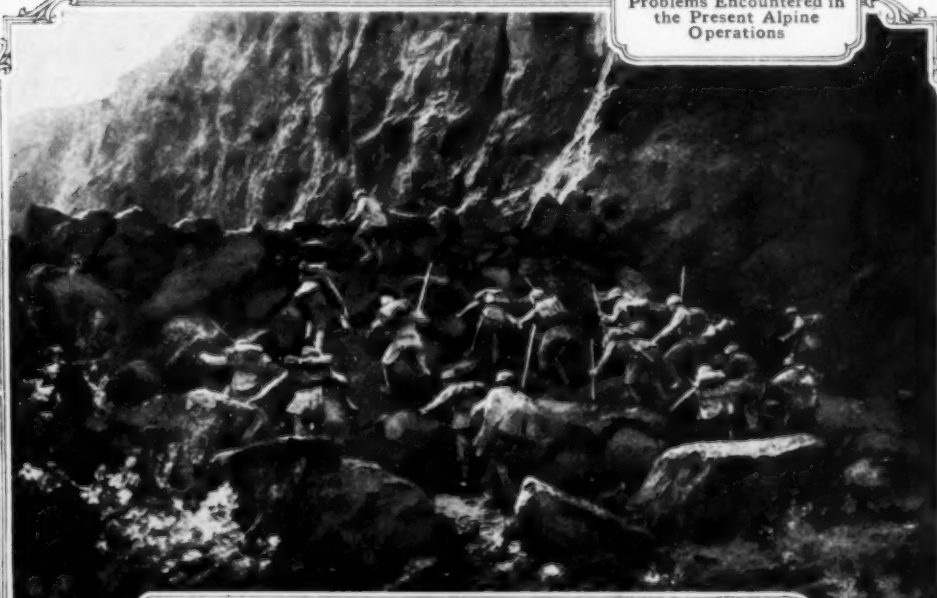
PHOTO COPYRIGHT, WATERMAN

Officers and Crew of the "U 53" Grouped about the Conning Tower, Following Its Departure from Newport the Submarine Torpedoed a Fleet of Alien Merchantmen

STRIKING VIEWS OF MOUNTAIN BATTLE FIELDS



Mouth of a Tunnel Extended for More than a Mile beneath a Mountain to Enable the Italians to Mine and Demolish a Strongly Fortified Position Held by the Austrians. This Gives an Idea of the Tremendous Problems Encountered in the Present Alpine Operations



An Italian Charge against an Austrian Stronghold That has Just been Blown Up by a Mine. The Soldiers are Scrambling over Massive Rocks That Separate Them from the Enemy. Obstacles of This Kind Confront the Troops at Every Turn and Make Progress Extremely Slow and Hazardous

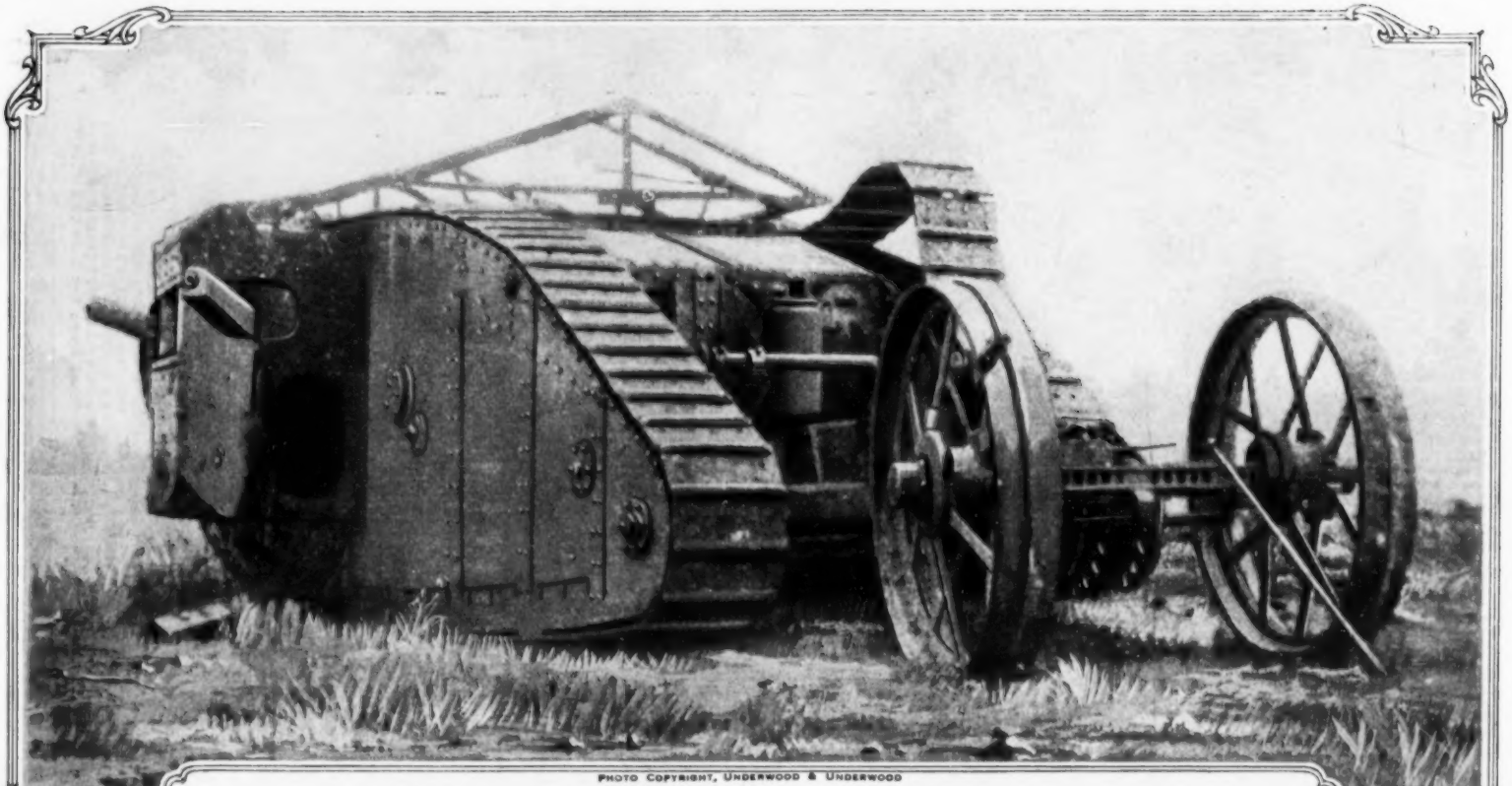
SHOWING ITALIAN ALPINE FORCES IN ACTION

PHOTO COPYRIGHTED BY PACH PHOTO NEWS, INC

Troopers Crouching Low and Advancing Rapidly in Open Formation across a Swift Mountain Stream While Facing the Carefully Aimed Bullets of Austrian Sharpshooters Hidden in the Rough Crags Above. A Thrilling Moment, to Be Sure, but All in a Day's Work

Armor is again Coming into Use as Equipment for the Fighter. Many Italian Soldiers are Now Provided with Steel Breast and Shoulder Plates in Addition to the Universally Employed Helmet

To be Wounded While Fighting in the Alps Is Often a Far More Serious Matter than One might Suspect, for Frequently Days are Spent in Reaching a Railroad. Here Wounded Men are being Lowered Several Hundred Feet down the Side of a Cliff



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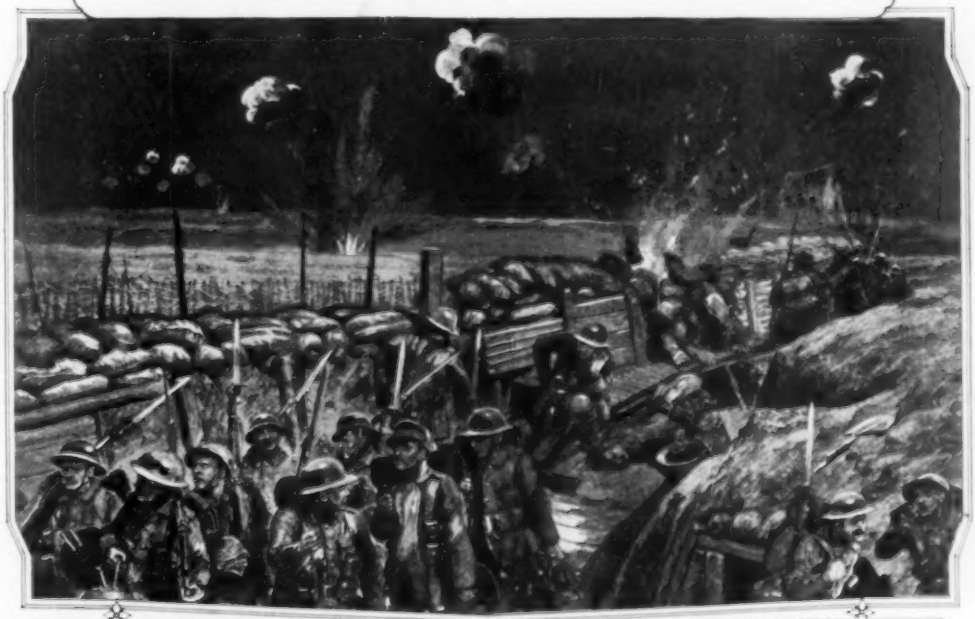
BRITISH ARMORED "TANK" CAR: NEW STEEL MONSTER OF DESTRUCTION

ASIDE from the big howitzers with which Germany startled the world at the outbreak of the war, probably no other new engines of annihilation have attracted so much attention or speculation as have the demonlike "tank" cars recently introduced in the western theater by the British. These big mobile forts, according to correspondents, are able to clamber over trenches, cross small streams, smash redoubts, crush down buildings and rise over the debris, and in fact go wherever their pilots choose to direct them. Herewith is an actual photograph of one of these remarkable machines, built in America, but armored and armed in Europe. It is shown on a field where it has either been abandoned or is awaiting repair. One of its traction bands, it will be observed, has been damaged by shell fire. The true military importance of these great machines is yet to be proved. The British have admitted that they are but experiments, and the Germans have contended they are failures.

GERMAN OPERATIONS IN TOWNS AND TRENCHES

FROM THE SPHERE, LONDON, COPYRIGHTED IN THE UNITED STATES BY THE NEW YORK HERALD CO.

STORIES of the wholesale deportation of civilians from Lille, Roubaix, Tourcoing, and other French towns, to German labor colonies have come from official sources of late. According to reports, whole families, including children, have been separated and sent into unknown districts by the German authorities. Daughters have been taken from aged parents, it is said, without anyone, except their captors, knowing their destinations. Some of the accounts are too horrible to believe. The above illustration tells a part of the story.



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BRITISH Tommies evacuating a section of an advanced trench in the western theater which is about to be blown up by the Germans: a drawing that depicts an interesting phase of modern warfare. Frequently it is possible to detect the mining operations of the enemy by the sounds of picks. The soldiers stay at their places until the noises cease. The silence is a warning, indicating the completion of the tunneling. While the enemy is placing the explosives, the soldiers leave their posts for a point of safety.

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War's Scrap Heap, an Actual Photograph Showing the Harvest of a Battle Field: The Picture was Taken behind the Austrian Lines in the Alps While Dead and Wounded Soldiers were being Brought to This Grassy Slope by Stretcher Bearers. The Wounded are Awaiting Treatment and Transportation to the Rear; Long Gray Trenches Are Ready for the Others. The Scene Is a Striking but Common One

Salvaging Human Wrecks *from* War's Scrap Heap

IN THREE PARTS

By Searle Hendee

PART I—Transporting the Wounded

WITH astonishing rapidity the war is populating Europe with mental and physical cripples. Never has humanity faced a more titanic problem than is being presented as the thousands upon thousands of human wrecks are reclaimed from the shell-pitted battle fields and returned to civil life. In our Rebellion, and in most other conflicts of the past, horribly mangled soldiers usually died where they fell, for lack of ready and expert attention. In Europe today, however, human remnants are pieced together and made to live. Some of these partly rebuilt men are without arms and legs, many are sightless, faceless, or deaf, while others have the minds of children.

Each of the several nations at war is confronted with an analogous situation. If left unaided—as has most often been the case in the past—these parts of men, who have given their best for love of country, would form armies of maimed beggars, paupers, suicides, and, perhaps, even criminals so vast as to threaten the future welfare of civilization. Therefore the work that is being done the world over to help them regain hope and courage, and to equip and train them to be of real use to themselves and society, is of absorbing interest and inestimable importance.

If Not Rendered Helpless When Struck by a Bullet or Piece of Shrapnel, the Soldier Uses His First-Aid Kit and Then Either Makes His Way to a Dressing Station in the Third-Line Trenches, or Awaits the Arrival of Stretcher Bearers. If Entirely Helpless, a Comrade may Reach Him and Dress His Wounds

The salvaging of Europe's maimed begins on the battle fields. It is being accomplished by a thoroughly organized system of almost clocklike precision new to warfare. At the outset of hostilities none of the nations had a medical corps of sufficient size or equipment to cope with the appalling number of wounded and incapacitated soldiers requiring immediate attention during and after the great battles on various fronts. In two years, however, the medical departments of the contending allied forces have been enlarged and strengthened by efficient organization, the addition of world-famous specialists, and the acquisition of the most complete facilities modern skill has been able to perfect.

The success of a modern army is dependent to a vital degree upon the capacity of its medical service, just as it is upon the foresight of its commanders, the bravery of its men, the accuracy of its gunners, and the maintenance of its lines of communication.

It is not surprising therefore that we find some of the most heroic and self-sacrificing work of the whole war being done by stretcher bearers, nurses, and ambulance, field, and hospital staffs.

The Stretcher Bearers have Paused at a Clearing and the Wounded are Writing and Dictating Post Cards to the Folks at Home. In the Foreground a Chaplain is Scribbling a Hurried Message for a "Tommy" Whose Right Arm Is Out of Order. After a Big Engagement, However, Attention of This Kind Is Impossible

Transportation of the wounded from firing line to hospital is a complex and often hazardous undertaking that is frequently carried out with the utmost difficulty. But like all things in war, it is done—and promptly—despite the most stupendous obstacles. Dispatch is the keynote of all endeavors, yet the progress of a battle cannot be interfered with in the slightest degree. During the big encounters it is not infrequent that cars form an almost uninterrupted procession to and fro between ambulance stations and clearing hospitals. This is necessary, a matter of life and death, but no matter how great the emergency, or how bad or few the roads, the movement of troops and their munition and supply convoys cannot be obstructed for even a minute. Furthermore, in the fighting zone, ambulances and hospitals are expected to be ever ready to handle whatever sit-

DRAWN BY F. MATANIA FOR THE SPHERE, LONDON, AND COPYRIGHTED IN THE UNITED STATES BY THE NEW YORK HERALD COMPANY

Theater of Heroism and Death: "No Man's Land," the Bullet-Swept Zone between Firing Lines. Crawling on Hands and Knees over Rough Ground and Barbed-Wire Snarls, Stretcher Bearers Reach the Fallen

COURTESY OF LA NATURE, PARIS

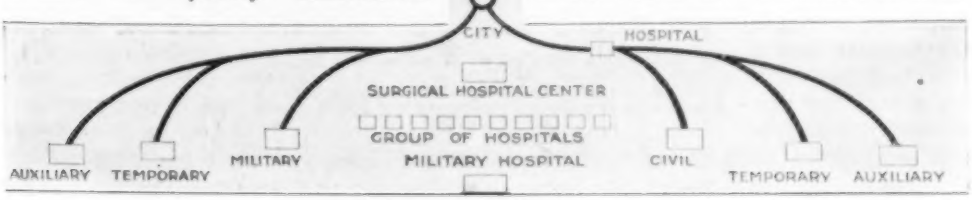
Showing Diagrammatically How the Wounded are Removed from the Average Battle Field and Conveyed to Hospitals: Facilities and Systems Vary Here and There, but This Arrangement Is Typical, at Least on the Western Front

Munition and Supply Trains Always Have the Right of Way and No Matter How Great the Emergency or How Bad the Roads, the Transportation of Wounded Soldiers must in No Way Interfere with Their Progress or the Movement of Troops

uation may arise. Always there must be vacant beds in the wards to accommodate incoming patients, nurses and surgeons must be available to give the wounded the best possible care, and men who are not permanently disabled must quickly be restored to normal so that they can be returned to the front.

In this connection it should be understood that at the outset of the war motor-car ambulances were exceedingly few in number, trains outfitted for the wounded were scarce and poorly appointed, and a large proportion of the hospitals now in use were yet to be established. Undoubtedly conditions similar to those encountered in France at that time existed in all of the other warring countries. At any rate, despite the reorganization of the French medical department a few years ago, the personnel was poorly constituted when the war began. For instance, there is a case in which a celebrated surgeon served for some time as a mere orderly in a contagious-disease hospital. In another instance, an eminent alienist was detailed in some minor capacity on a hospital train. An authority on X-ray work was engaged as a stretcher bearer. In view of the overwhelming haste that marked the provision of facilities during the first weeks of the conflict, such things as these are not surprising. Errors of this sort were remedied as rapidly as things could be arranged on an efficient basis, and today the service operates smoothly.

Fully a half, if not more, of the civilian physicians and surgeons of Europe have abandoned their practices and are now engaged solely in military work. Large numbers of those who had retired from active work have volunteered their



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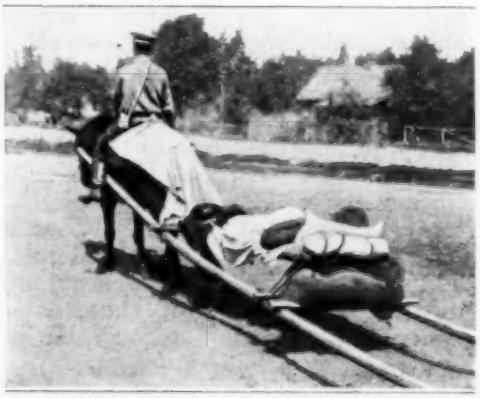
Most Often the "First Ambulance" is Situated in a Village at the Rear, Out of Range of the Firing. This Here to Receive the Wounded Who are Carried back from the First-Aid Posts. At These Places a Competent

services to their respective governments. This is even true of women practitioners. It is also worth noting that specialists of international fame, as well as students, from certain neutral countries have entered the foreign service in various capacities. On the other hand, hospitals have sprung up everywhere. In London, for example, there are now 186 military institutions. About 40 of these are regular army hospitals, while the remainder are converted buildings and residences of various sizes and kinds. All are under the immediate control of the war office. At Berlin, Paris, Vienna, Milan, and elsewhere, like conditions prevail.



All of Europe's Wounded do Not Travel in Motors: Crude Conveyances of This Kind, Which Recall American Indian Days, were Used in Moving Russian Crippled to the Rear Following a Big Battle on the Eastern Front

This briefly is a superficial survey of the general situation. To understand what takes place from the time a soldier is struck by a projectile until he is either returned a few weeks later to the trenches, or is fitted, months later, for civil life, we must trace the ground step by step and consider typical cases.

When a soldier is wounded, unless he is rendered unconscious or entirely helpless, he makes use of his first-aid outfit. If he

THE UNITED STATES BY THE NEW YORK HERALD COMPANY
Is One of the British Stations in a Typical Battle-Zone Town. Motor and Horse-Drawn Ambulances Assemble Surgical Staff is Maintained and Operations are Often Performed on Those Who Require Immediate Attention

is unable to act for himself, a comrade usually comes to his assistance. The wound is sterilized with iodine and bandaged. In case, during an attack, he happens to fall on "No Man's Land"—that bullet-swept area between the firing lines — he must either crawl back to the first-line trench or make the best of his situation until reached by regimental stretcher bearers during a lull in the fighting, or after darkness has come. His wait may be brief, or it may constitute hours filled with agony. But eventually some fearless fellow will crawl over the clods and through the snarls of barbed wire and drag him to a shielding crater, or pull him back to "safety," where aid can be rendered.

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Wheeled Stretchers of This Type are Occasionally Employed to Facilitate the Removal of Disabled Men to the Ambulances When the Distance from the First-Aid Post Is Great. Such Journeys are Very Frequently Made under Fire

First-aid, or dressing, stations are maintained along the third-line trenches, but in the midst of severe fighting the danger is often too great for one of these to be reached. In such cases a wounded man either walks or is carried by Red Cross members of his regiment to "refuges" or dugouts in the second line. Usually an assistant surgeon and a couple of stretcher bearers are at these

points, so that at times a man may be attended there or even at the spot where he has fallen. Eventually he reaches the first-aid post, guided by arrows set in the trench walls if he walks the distance. Such a station is commonly an excavation, sheltered from rifle and light-artillery fire, in charge of a major of the medical corps. The first separation of patients occurs here. The wounds of a soldier are dressed, and, if they are very slight, the man is sent back to his unit. Those who require further attention, but can walk, are directed ahead to the first-line ambulance, while others who are helpless are taken in charge by the division stretcher bearers.

Operating Rooms are Always Provided in Well-Equipped Hospital Trains and, Like Other Facilities, There Is Use for Them. Here an Urgent Operation is being Performed upon a French Soldier While the Train Is in Motion

Most often the "first ambulance" is situated in a village or on a farm at the rear, often out of the range of the enemy's guns. The journey to it, however, is not always easy, for the intervening zone is under fire. There are times when it can be reached only at night by following secluded roads, but now and then the trip is made even with wagons and carts in daytime. The first ambulance is more than the name possibly indicates. At it a competent surgical staff, supervised by a chief surgeon, is maintained. Men who arrive there without having had previous attention are looked after, while serious cases, of which notation has been made by the major at the first-aid camp, have their wounds redressed and fractured bones reset. When it is particularly urgent, an operation is performed. Usually a motor car, fully equipped as an operating laboratory and having a special surgeon and a radiologist in charge, is available so that such work can be properly accomplished. While he is here a card bearing a hurried diagnosis of his case is pinned to each soldier. The color of this slip indicates in what manner the patient should be transported, whether sitting or reclining, and how many miles at a time. If he is not wounded, but sick, the color discloses the fact.

At this post everything is made ready for conveying the wounded to the clearing hospital situated from 6 to 12 miles back of the trenches. The means of transportation varies in different localities. Motor ambulances are generally employed, but occasionally there are light, temporary railways on which small stretcher cars drawn by a donkey engine, are operated. The hospital is located adjacent to a standard railway line and, as its name suggests, is a sorting station. Expert surgical service is almost always maintained, so that emergency cases that have not been attended to previously can be handled without further delay. Those who are in a dangerous condition, or have suffered seriously as a result of the journey from the trenches, are held until they are sufficiently improved to continue the trip. Soldiers who are not badly hurt remain only long enough to recover from fatigue and board trains departing for the distributing station. In fact the latter is a general destination that is reached just as quickly as con-

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Procession of Wounded and Worn-Out Soldiers Passing to the Rear. In the Foreground, Supported between Two Comrades, Is a Badly Wounded "Tommy," Drenched in Blood

ditions will permit, and is the dividing line between the army zone and the rear.

As a train pulls in with several hundred wounded men, the real diagnosis and disposition of patients is accomplished by those in charge of the hospitals of the distributing station. At short distances are special institutions for the care of different types of cases. Soldiers afflicted with contagious diseases are immediately conveyed to isolation hospitals and not allowed to get farther to the rear. Men with wounds affecting the eyes, ears, nose, or throat receive the attention of experts. Those requiring special surgical aid of other character are looked after similarly, while soldiers with mental or neurotic troubles—which are frequent—are transported to a center where neurological and psychiatric authorities are retained. It will thus be seen that specialization is the keynote of the whole system and that within a comparatively short distance of the battle lines the kind of attention needed by most individual cases is to be found. But at these hospitals within the army zone, patients can remain only briefly. As quickly as they have been properly treated and can safely be moved, they are carried on to the rear. The exceptions to this rule are the soldiers with fever or other contagious maladies, and those who will be ready to return to the trenches within a week or less. Men who have become exhausted during terrific fighting and broken under it, usually are sent to the hospitals adjacent to the distributing station for a complete rest.

It will be understood that there is a distributing station back of each army. The trains leaving these individual posts convey the wounded to specific centers. When the first station farther on, known as a divisional, or district, redistribution station, is reached, Red Cross attendants are instructed regarding the final discharge of the wounded. Orders of this nature are issued by the superintendent of the sanitary service of the district, who is informed about the available accom-

modations in his zone. A certain number of patients can be cared for at one town, so many more at the next, and so on. Each of these towns supports a group of specialized hospitals which are placed under the general classification of military, civil, mixed, temporary, auxiliary, and permanent. As the train arrives at such point it is met by ambulances and the wounded are whizzed off to whatever institution is particularly fitted for administering the special care required by the individual patients.

Thus the injured reach the bases where they are either mended and eventually returned to the fighting line, or rebuilt for civil life. This, however, constitutes another story; one which deals with some of the most remarkable human accomplishments of the present era.

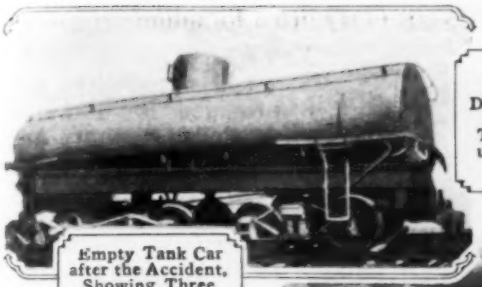
TRUCK CARRIES TON LOAD ACROSS THE CONTINENT

A big motor truck recently carried a ton of condensed milk from Seattle, Wash., to New York City. The first part of the route followed the National Parks Highway, through the northern tier of western states. East of the Mississippi the car passed through Wisconsin and Illinois and thence went directly east to New York. The actual running time required for covering the distance, which is estimated at 3,640 miles, was 31 days. The trip was made under the auspices of the Seattle Chamber of Commerce, and in addition to serving as an advertisement, was undertaken as a preparedness demonstration, showing in a striking manner the service which trucks could be called on to perform in case of military necessity. The wife of the driver accompanied him the entire distance.

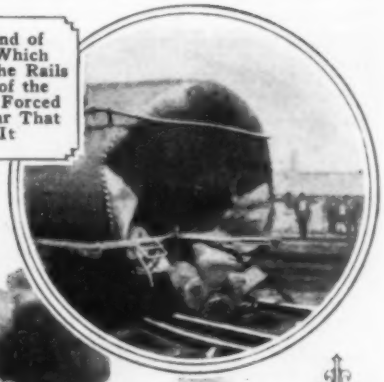
EMPTY TANK CAR CRASHES INTO LOADED ONES

Several unusual features marked a railroad wreck that occurred recently in San Diego, Calif. Shortly after a switch engine had drawn a line of loaded tank cars onto the main line of the railroad a second engine approached, pushing an empty tank car. The engineer asserts that a cloud of dust obstructed his view. At any rate, the empty car crashed into the filled cars with considerable force. The car that was struck was seriously damaged. Of its two trucks the one nearest the engine was torn loose and was forced

Motor Truck Which Recently Made a Demonstration Trip of 3,640 Miles, Carrying a Ton of Condensed Milk from Seattle to New York City

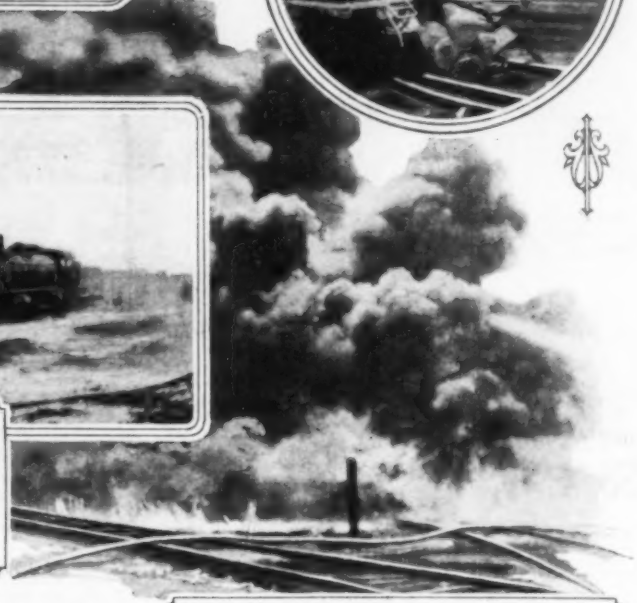


Empty Tank Car after the Accident, Showing Three Trucks beneath It. The One at the Extreme Left Belongs to the Car That was Staved In



Battered End of Tank Car Which Dropped to the Rails After One of the Trucks was Forced under the Car That Struck It

View Taken After the Fire had been Put Out, Showing the Car That Lost One of Its Trucks and, on being Punctured by the Car Next to It, was Emptied of Distillate, Which Caught Fire



The Fire at Its Height: Quantities of Distillate Poured from the Car That was Staved In and, Running under the Engine, Caught Fire. The Crew was Forced to Abandon the Engine to the Flames

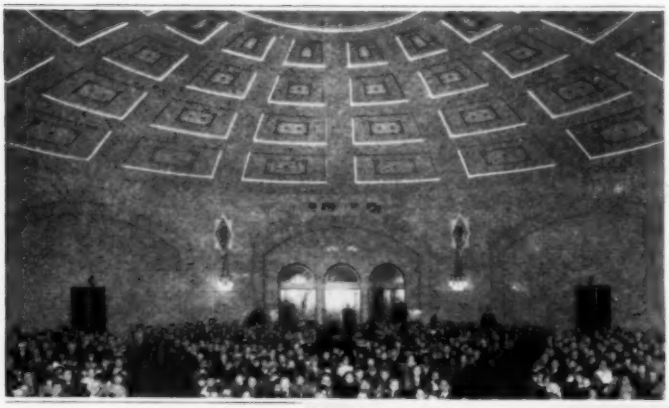
under the end of the empty car, at the same time dislodging that car's front truck and pushing it back toward the engine. Thus after the wreck, this empty car appeared with three trucks under it. Its bumper pierced the loaded car ahead, one end of which dropped to the track, and quantities of distillate poured out on the ground. This suddenly burst into flame when the oil flowed under the engine's fire box. In the two hours that the fire burned the engine as well as the wrecked cars suffered severely, the crew being unable to detach their locomotive.

¶The astonishing increase in automobile traffic has created a great demand for men who are both skilled road builders and executives fitted to head departments devoted to road and street improvement.

HEMP-STALK FRAGMENTS FOR PAPER MAKING

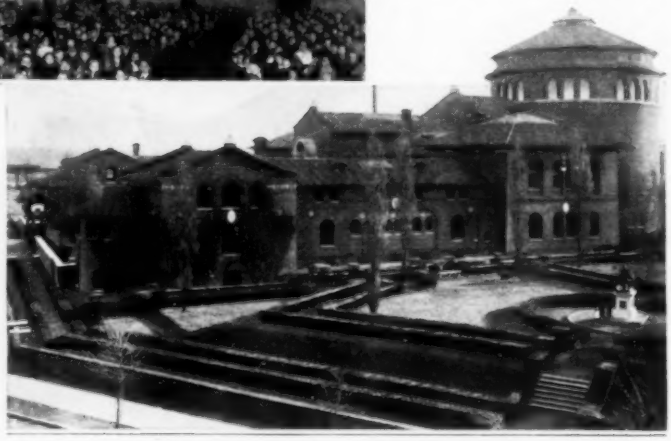
In an effort to find a material for making book paper, which can be used as a substitute for wood pulp, investigators for the Department of Agriculture have discovered that the fragments from hemp stalks serve very satisfactorily. The hurds, as they are called, are the waste produced in preparing hemp fiber for the market. They can be reduced chemically to paper stock by a process which differs but little from that used in making pulp from poplar wood. It requires more bleaching and beating, but the first steps in its preparation are less expensive.

CIRCULAR HALL POSSESSES GOOD ACOUSTICS



Interior of the Circular, Tile-Lined Auditorium in the Museum Building at the University of Pennsylvania

In a new section, recently added to the museum building at the University of Pennsylvania, a circular-walled auditorium, with a flat-dome ceiling and no windows, has been provided. Several things make the room worthy of notice. Its acoustic properties are splendid, for, when filled to its capacity, words spoken from the platform can be heard distinctly in all parts of the auditorium, and furthermore there is not the slightest suggestion of an echo. Not only the design of the room, but also the materials used in its walls, are responsible for this quality. The ceiling is divided into panels that radiate from a circular area in the middle, within which a large bronze sunburst is fixed. Each is centered by a white-glazed tile grille, which is used for ventilating purposes, and bordered by a plain tile band in semiglazed green. The remainder of the ceiling and the upper part of the walls are covered with gray-brown, soft-burned and porous tile. A similar tile, hard-burned and thinly glazed, lines the lower four feet of the walls. In addition to the sunburst in the center of the ceiling, eight wall chandeliers are provided for illumination. Washed and tempered air enters the room at the rate of 25,000 cu. ft. a minute through ventilators fixed beneath each of the 829 seats. The stage is built as an extension of the building and does not project into the room, which is of odd, but also comfortable and pleasing, appearance.



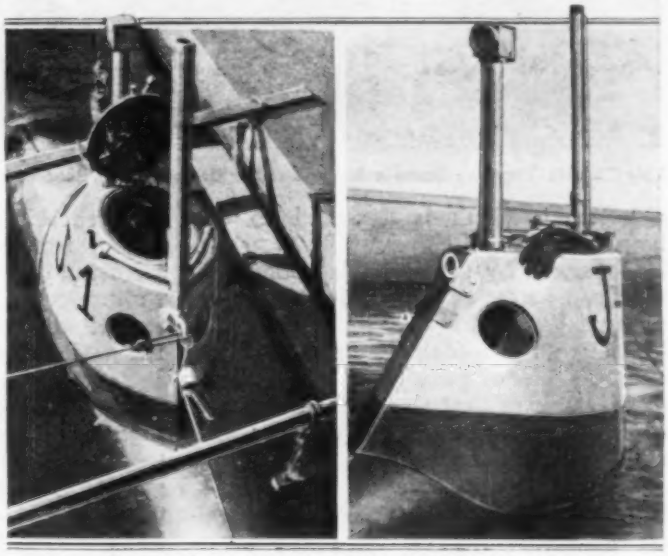
Museum Building at the University of Pennsylvania as It Appears Since the New Addition, Which Includes the Tower at the Right, has been Completed

MOTION PICTURES TAKEN OF SCENES MILES AWAY

Experiments recently conducted by the Bureau of Standards at Washington show that motion-picture photography of a very novel character is now a possibility. It was found that, by equipping a motion-picture camera with lenses similar to those used in a telescope, motion pictures could be taken of objects which were several miles distant. While this is just what might be expected in view of the fact that telescopic lenses are used in connection with other cameras with success, it opens a very interesting field of experimentation.

TINY U-BOAT MAY EMBODY IMPORTANT INVENTIONS

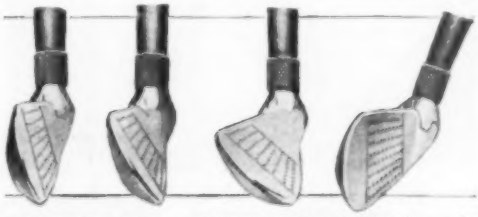
Tests conducted in the vicinity of Long Beach, Calif., with a baby submarine of recent development have drawn notice to some seemingly remarkable features present in this strangest of modern under-sea craft. According to reports the little boat is capable of making a surface speed of slightly more than 40 miles an hour, and of going about 22½ miles an hour when under water. These rates are approximately double those of the average under-sea vessel. The tiny craft is operated by one man and carries a single torpedo forward of the conning tower. It is designed as a vessel for coast patrol, harbor defense, and fleet auxiliary purposes. Twenty-five feet covers the length of the boat, which has a beam of only 28 in., and a depth of 7 ft. 8 in. Screw propellers are mounted fore and aft and driven by a 135-hp. gasoline engine which is used not only when the vessel is on the surface, but also when it is submerged. This, as is almost evident, is a point of utmost importance, providing thoroughly successful operation proves to be possible. The necessity of carrying two distinct power plants has been one of the weak points in modern submarines. The inventor of the craft in question has not obtained patent rights as yet, and therefore carefully guards his secret. It is stated, however, that when the vessel is running submerged the exhaust gases are disposed of by chemical means. It is understood that they are condensed, the waste elements being discarded in liquid form, and that oxygen is taken from water, mixed with the remaining "remodeled" vapors and the resulting product fed to the engine as fuel. A horizontal propeller submerges the vessel by drawing it straight down. The latter's buoyancy causes it to rise to the surface of its own accord when this propeller is stopped. A naval vessel could carry a small fleet of these craft and launch them quickly.



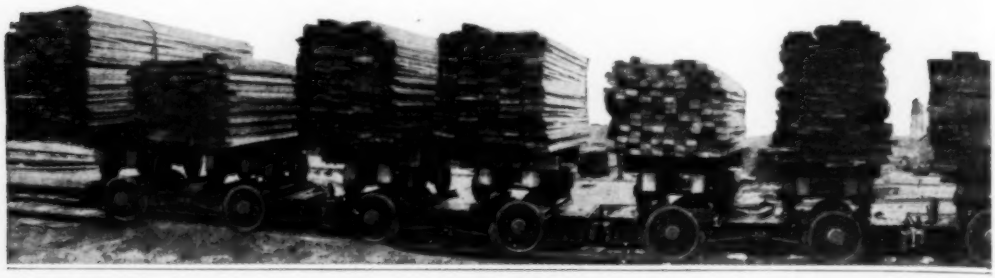
The Picture at the Left Gives a General View of the Tiny Submarine, While in That at the Right a Glove Shows by Comparison the Smallness of the Conning Tower

FIVE GOLF STICKS ARE COMBINED IN ONE

Taking advantage of the fact that many golf experts advise the use of as few golf clubs as possible, a Chicago concern has gone one step farther and devised a club which can be used instead of any one of five different sticks. This club is equipped with an adjust-



A Golf Stick with an Adjustable Head, Which can be Used Instead of Any One of Five Different Clubs



This Electric Tramway Saves a Large Lumber Company in Wisconsin More than $18,000 a Year in the Cost

able head which is attached to the handle by a steel collar. The head can be loosened by turning this collar and then can be set at any angle the player may wish. In this way he can provide himself with a driver, brassie, mid-iron, mashie, or putter. It is the claim of the makers that the constant use of this club will give the player increased skill and confidence.

CONCRETE ENDURES FIRE BETTER THAN GRANITE

A recent fire which did extensive damage to a railroad pier in Philadelphia showed in a striking manner the difference in the ability of the granite and the concrete in that structure to withstand intense heat followed by sudden cold. The fire was so hot that it melted some of the casements, and the walls were heated almost red-hot. When the firemen turned streams of water against them, the sudden contact of the cold water caused splinters to fly off in all directions from the granite blocks of which the foundation and steps were made, but the concrete walls were injured only very slightly. It was found necessary to remove the granite blocks, while the concrete walls are still in use in the reconstructed building.

View of a Concrete Wall and Granite Foundation and Steps of a Philadelphia Building Taken after a Fire, Showing How the Granite Chipped and Cracked, While the Concrete was Scarcely Damaged at All

GERMANS WOULD ESTABLISH AERO-POST SERVICE

An indication that the war has been a great aid in developing aerial navigation is found in the fact that a corporation in Berlin proposes to establish an international aerial-post service, and if this proves successful, a passenger line. The experience with heavier-than-air machines in the present war fully warrants such an enterprise, in the opinion of the promoters. The company hopes to run a line between Berlin and Constantinople, via Carlsbad, Vienna, Budapest, etc. Between these larger cities there will be numerous landing stations, the cities chosen for landing to subscribe for shares in the company. In Carlsbad a representative of the corporation has investigated the possibility of securing an old race course for a landing station.

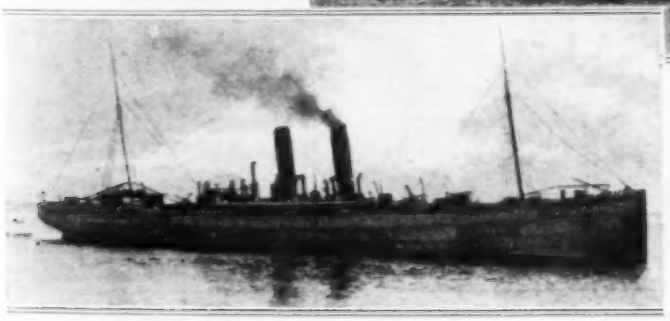
of Hauling Material to and from Different Points in the Yards. Formerly the Work was Done by Horses

ELECTRIC LINE CUTS COST OF HAULING LUMBER

Sixty dollars a day is the saving effected by a Wisconsin lumber company through the use of an electric transportation system in its yards. An average of about 600,000 feet of lumber is handled daily between the sawmill, planing mill, shipping platforms, and stacks. In the past, this cartage was done with horses. The electrification of the line wiped out the cost of supporting the animals and made it possible to eliminate 16 men from the payroll. Four miles of track are maintained. An overhead trolley supplies current to a small electric locomotive which pulls a string of squatty cars. Each of the latter has a couple of tracks extending across it, and these accommodate the heavy trucks on which the lumber is piled. In spite of the fact that a larger territory is covered than formerly, the present system makes it possible for nine men to take care of all the carting. Other advantages have also resulted.

COASTWISE SHIP "CONGRESS" BURNS OFF COOS BAY

When about 30 miles off the mouth of Coos Bay, Ore., late in the summer, the steamship "Congress," bound from Seattle to San Francisco with 253 passengers and a crew of 175 men, burst into flames. "S O S" calls were sent out, and the vessel headed for the bay, but before the latter was reached fire had eaten its way to the engine room. The dash was continued under a dying head of steam. The United States Army dredge "P. S. Michie" then came near, the ship was



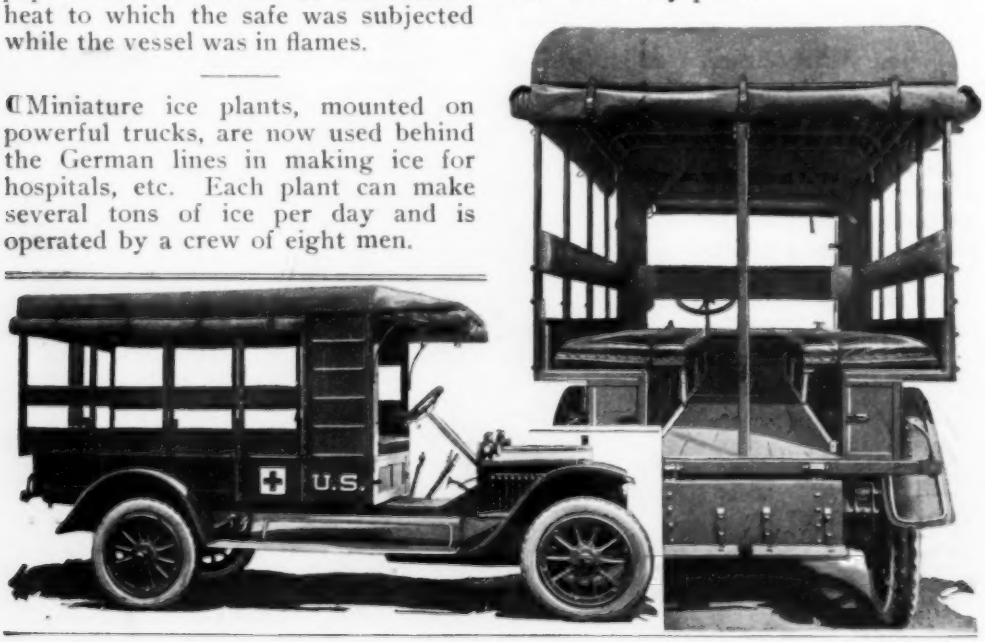
The Upper Picture Shows the "Congress" in Flames and Those Aboard Taking to the Boats. That at the Left was Snapped Afterward

anchored, and those aboard lowered in the starboard boats and transferred to the dredge as well as to the steamships "Yellowstone" and "Tillamook," which had also come up. Dense smoke and flames made the use of the boats on the port side impossible. The vessel burned to its steel hull and two days later was towed into port, where its boilers and engines, in addition to the fuel tanks, which contained 3,500 gal. of oil, were found to be in fair condition. It was then decided to repair the ship sufficiently to permit it to make Puget Sound, under its own steam, where it will be rebuilt. The vessel was constructed in 1913 and at that time, with a length of 441 ft. and a tonnage of 7,985, was known as the largest ship so far constructed for coastwise trade in this country. With its cargo the "Congress" was valued at about $2,250,000. The salvage amounts to approximately $750,000. The ship's safe contained money and jewelry amounting to about $20,000, and also documents of value belonging to passengers. These things were recovered after the fire, although some of the papers showed effects of the intense heat to which the safe was subjected while the vessel was in flames.

¶ Miniature ice plants, mounted on powerful trucks, are now used behind the German lines in making ice for hospitals, etc. Each plant can make several tons of ice per day and is operated by a crew of eight men.

MOTOR AMBULANCES BUILT FOR BORDER SERVICE

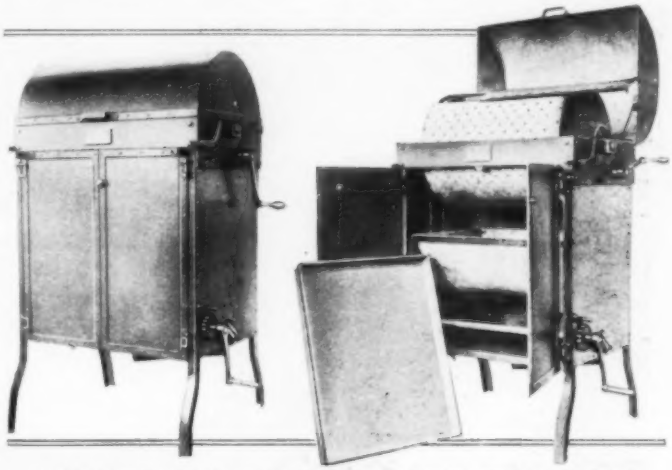
Motor-car ambulances of an apparently durable type have been constructed for the Red Cross corps and put in service at the Mexican border. So accustomed have most persons become to pictures of the elaborate fighting equipment used by the warring forces abroad that it is possible many have lost sight of the fact that our own troops are not in all instances similarly outfitted. It therefore may be news to some that the new machines replace mule-drawn ambulances that were in use until the National Guard was mobilized some months ago. Each of the cars is supplied with four stretchers, two of which rest on the side seats beneath the others, which are suspended when in use. At the right of the driver's seat a medicine cabinet is provided, while lockers, in which various supplies can be carried, are fitted lengthwise beneath each of the two long seats. Stretchers of the folding type are used, and when not in actual service, are carried in an out-of-the-way place.



Side and End Views, Showing Type of Red Cross Ambulances Lately Placed in Service at the Mexican Border

WASHER FOR PRINTER'S METAL FURNITURE

The cleaning of printer's metal furniture—the blocks and other pieces used to fill up blank spaces in a page of type—can be done quickly and economically with a washer which has been put on the market lately. The machine has a substantial metal case which entirely incloses a wood-lined cylinder, or drum, in the wall of which are numerous holes. It also incloses a tank for holding benzine. Parts to be washed are placed in the cylinder. The tank containing the benzine is raised, by means of the lower of two cranks at one end of the washer, so that the drum is partly immersed in the oil. Then, by turning the upper crank slowly, the drum is made to revolve and its contents is subjected to a thorough rinsing. After about three minutes the tank is lowered and the furniture emptied onto a large tray, to drain. The benzine can be used again and again by drawing it off through a cock, after which the dirt, which always settles to the bottom, can be removed separately. The machine being inclosed, the danger of the benzine catching fire is small.



A Machine for Washing the Metal Parts Used in Filling the Blank Spaces in a Page of Type

MOTORISTS USE INCLINES INSTEAD OF GATES

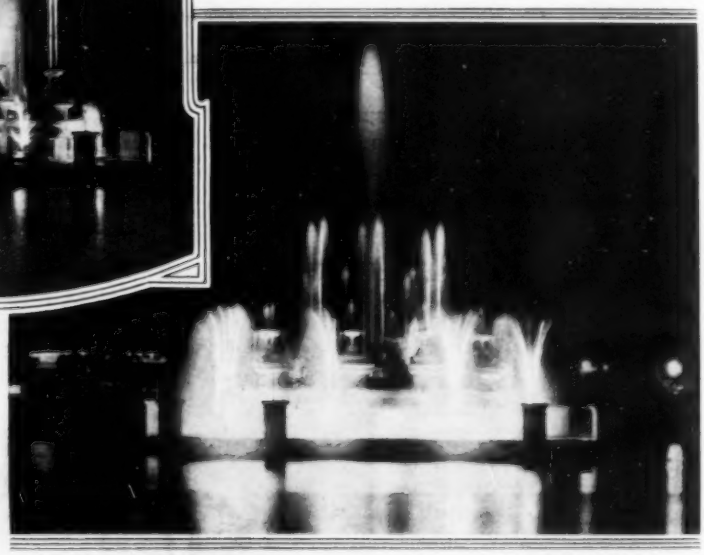
In many parts of the West and Southwest where automobiles are numerous it is becoming common to drive one's car over a fence instead of stopping to open a gate, drive through, and then shut it. The new and quicker method is made possible by the construction of inclines which make it an easy matter to mount to the top of the barrier and then descend on the other side. The inclines are usually composed of two tracks, set the proper distance apart for automobile wheels and supported by posts. The tracks are equipped with a guard at one side, which prevents a car from running off, although accidents happen occasionally in spite of this provision. Cattle will not walk up these inclines, since ordinarily no floor is laid between the tracks.

An Incline on a Ranch in Western Texas Which Enables the Motorist to Dispense with Opening and Closing a Gate

ELECTRIC FOUNTAIN BUILT IN PHILADELPHIA PARK

At one of the parks near Philadelphia where concerts by world-famous orchestras and bands are conducted during the summer months, a magnificent fountain has been constructed in the middle of a small artificial lake that lies near the music pavilion. From a purely artistic standpoint, the structure is a noteworthy one. It is of the greatest beauty, however, at night when illuminated. At such times only its softly shadowed outlines are visible, while light of different hues filters through the ascending shafts and the soft, floating sprays of water. When silhouetted against a black sky and reflected in the dark, glimmering waters of the lake, the fountain is an inspiring sight. Many thousand persons gather along the water's edge to enjoy the concerts, and while the latter are in progress the color effects of the fountain are changed continually to harmonize with the character and rhythm of the music.

When the Primary Colors are Projected upon the Slender Shafts of Water, the Effect of a Colossal Spectrum is Produced



The So-Called "Wheat Sheaves," Consisting of Several Units of Lower Shafts, Take On All of the Hues of the Rainbow, to Depict the Autumnal Changes of Color

SOLDIER-WOODMEN CUT ENGLAND'S FORESTS

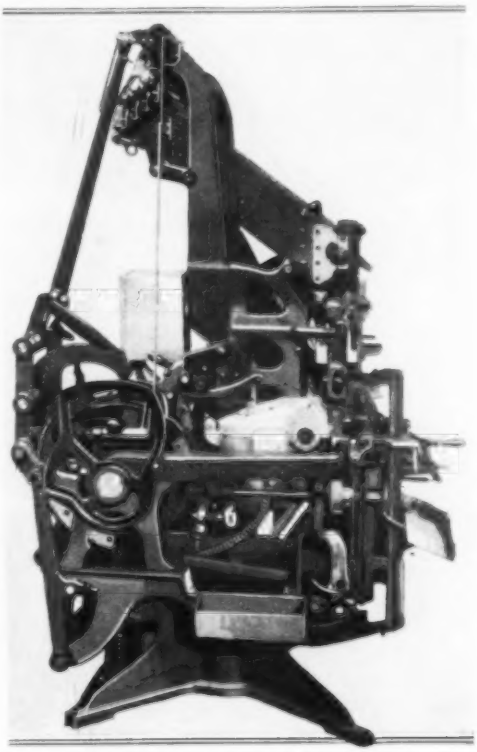
England is now sacrificing parts of its famous Epping and Windsor forests near London in order that it may supply its armies at the front with trench timbers, etc., and Canada is cooperating with the mother country by supplying the skilled men to cut down the trees and prepare the lumber. For this work two battalions of unusual character have been brought up to full military strength by enlistment of Canadian sawyers, axmen, canthook men, etc. These units are known as the forestry battalions. The illustration shows the Toronto contingent which has enlisted in this important work. The colossal destruction wrought by modern warfare has created an enor-

Toronto Unit Belonging to 238th Forestry Battalion of Canada, Which is Cutting Timber in the Historic Epping and Windsor Forests in England to Supply Troops at the Front with Trench Timbers

mous demand for timbers in various sorts of defensive construction. The Norwegian lumber supply having failed and shipment from Canada being regarded as impracticable, England with reluctance decided to sacrifice some of its forests, which are only about 100 miles from the front. Epping Forest is hundreds of years old and has been London's great natural playground. According to reports the Canadians now in England are turning out over a million feet of lumber a day.

LINOTYPE-METAL POTS NOW HEATED BY ELECTRICITY

An electrically heated metal pot for linotype machines, for which many advantages are claimed, is in some cases supplanting the gas-heated pots. The heat is generated in the midst of the metal instead of under the pot as is the case where gas is used. There being no gas fumes, special ventilators are not required. The heating unit consists of resistance ribbons of metal alloy incased in mica, fastened in strips, and welded inside of and to a steel casing. Two units are immersed in the metal; another is applied to the top of the mouthpiece, and one to the under side of the mouthpiece and throat. An automatic regulator keeps the molten metal within a few degrees of a predetermined temperature. By means of an attachment the current can be turned on automatically before work begins so that the machine will be ready at the proper hour. The cost of operation is practically identical with gas when gas costs $1.00 per 1,000 ft. and electricity three cents per kilowatt-hour.



The Metal Pot of This Linotype Machine is Kept at a Very Even Temperature by Electric Heating Units

TWO CITY CHURCHES BUILT LIKE SKYSCRAPERS

The rapid growth of cities in recent years has brought many churches face to face with the alternative of adapting

The $1,000,000 Business Block Recently Erected by the Trinity Methodist Church of Los Angeles: Three Floors will be Used for Church Purposes. The Others will be Occupied by a Hotel, Cafeteria, Banquet Room, Gymnasium, and Other Interests

themselves to the changed character of their neighborhoods or of retreating before spreading business centers and leaving them without churches. In some instances the problem is being met by adjusting the church's activities to its new environment. Two notable examples of this trend in organized religious effort are found in the Trinity Methodist Church of Los Angeles, which has recently opened a $1,000,000 business block, and the proposed Immanuel Baptist Church of Chicago. Both churches are located in business districts. The building which the Los Angeles congregation has erected is nine stories high. Three floors are reserved for church purposes and include an auditorium, seating 2,300, which is rented during the week for high-grade concerts, motion pictures, lectures, etc. The upper six floors are used as a hotel and contain 325 rooms. The lobby is located on the main floor. A cafeteria, banquet room, bowling alley, and gymnasium occupy the basement. The church which is to be erected in Chicago will be 10 stories high and will cost approximately $650,000. The first four floors, except the stores on the street level, will be devoted to various church activities, including such features as luncheons for working girls, aid for unfortunate men, etc.

INDIANS ARE MULTIPLYING AND PROSPERING

Contrary to a popular belief, which persists in spite of occasional denials, the Indians today are not a dying race. This fact has been emphasized recently by a government official who has visited many of the Indian reservations and declares that the red men are fast becoming producers and are satisfactorily adjusting themselves to civilized ways. Their oil holdings, for example, in Oklahoma and elsewhere, have made many of them wealthy. Large numbers have shown a natural ability in raising cattle, horses, and sheep. The official referred to recently sold a trainload of cattle for Indian stockmen in the West, which netted them approximately $100,000. This man predicts that before long the Indian will be the "cattle king" of this country and will also occupy an important place in the wool and horse markets. The enforcement of prohibition among the red men and a vigorous health campaign among them during recent years have done much to bring about the present steady increase in our Indian population.

¶Government employes have marked many wild ducks near Great Salt Lake with aluminum leg bands. Hunters killing any of these birds are asked to send full data about them to the Biological Survey at Washington, and so aid in collecting information regarding their habits and their recovery from a malady for which they have been treated.

Using Butterflies for Decorative Purposes

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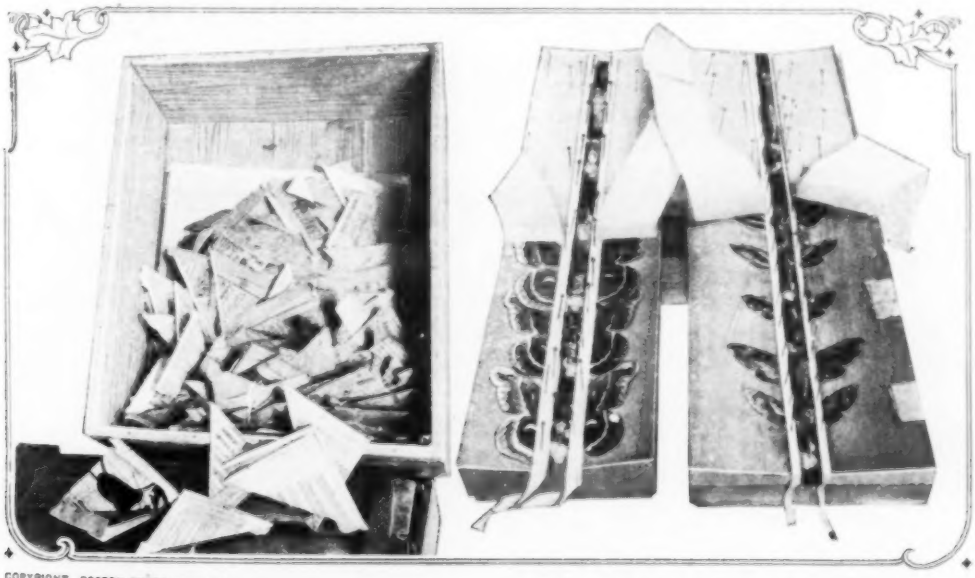
Mounting Butterflies on Pins for Bouquets and to be Used as Curtain Adornments

The collecting of rare and beautiful butterflies is ordinarily thought of as the interesting though not particularly profitable task of a naturalist, but in Boston there is a woman who has transformed butterfly collecting into a commercial enterprise yielding handsome profits. For this woman's unusual line of trade a force of trained collectors, scattered over all parts of the world, is engaged in gathering no less than 700,000 specimens a year. She was first interested in this work through the work of her husband, who was a Harvard entomologist. Now instead of these exquisite insects being mounted for scientific collections only, they are used chiefly for decorative purposes in a score of different ways by jewelers, florists, modistes, and others.

One of the pleasing uses to which the butterflies are put is to adorn place cards and novel post cards. In the latter case the wings only are used, the bodies being painted in realistically. The industry had not been established long before there developed a great demand for trays in the bottoms of which, under glass, butterflies were placed, sometimes with a pattern of



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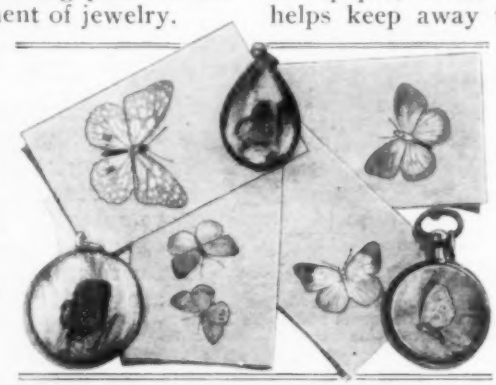
At the Left is Shown How the Delicate Specimens are Shipped, Each Butterfly being Wrapped in a Sheet of Paper and Then the Whole Consignment Packed in a Strong Box. At the Right: The Stretching Boards, on Which Narrow and Wide Strips of Cloth Hold the Wings While the Specimens are being Dried

pressed flowers and grasses. The trays are still very popular, as are also jewel cases, puff boxes, and coasters, in the tops or bottoms of which the winged creatures are mounted under glass. Another rapidly growing phase of the work is the adornment of jewelry. Today the woman who has made specimen collecting a source of profit receives from jewelers large consignments of lockets, between the crystals of which she mounts the many-hued insects. Generally these are placed with wings a little way apart, so that each butterfly seems about to alight. Strangely shaped iridescent beetles are also employed in this shop as ornaments, being mounted on hat pins, brooches, etc. Another branch of the enlarging industry is the growing of moths for various scientific institutions.



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Lockets beneath the Crystals of Which Small Delicately Colored Butterflies have been Mounted, and Post Cards Decorated with Butterfly Wings

Naturally these varied and increasing demands have not been met without the coöperation of specimen collectors. At the present time there are men in Peru, Brazil, Madagascar, Morocco, Australia, New Zealand, Siberia, and Central Africa, as well as many parts of the United States, who send butterflies to this Boston woman. When an insect is to be shipped it is carefully wrapped in paper—preferably newspaper, because the printing ink helps keep away the moths. A consignment is placed in a strong box and protected with soft packing so that it will not slip around. By the time it reaches Boston the insects are dry and brittle and must be kept for several hours in air-tight jars in which there are damp sponges. This serves to moisten the bodies so that they can be handled with tweezers. The butterflies are placed in rows on stretching frames, in the center of which is a slot in which the bodies rest. Narrow strips of tape are pinned down over the wings close to the bodies, after which the whole of the wings are covered with wider cloth strips. After this treatment they can be mounted as flat as desired. In putting them under glass, as for trays, they are held in place with glue. Specimens are sent to florists flat, but after they are placed among flowers or

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Serving Trays, Jewel Boxes, Lockets, and Bouquet Pins with Which Butterflies are Used with Striking Effects

plants the dampness serves to draw the wings up in a lifelike manner. One of the largest and rarest of all butterflies is sent from the Solomon Islands and measures about six inches across. These metallic-blue insects sell for $75 each. Other very gorgeous specimens are more common.

GERMANS FIND SUBSTITUTE FOR COTTON AND WOOL

Spinners and weavers of Germany claim that they have found in their own country a satisfactory and inexpensive substitute for cotton, wool, and jute—products which they now can obtain only with great difficulty because of the war. The plant is called the typha and is a sort of cat-tail that grows extensively in marshes. This year's crop is estimated at between 1,500,000 and 6,000,000 tons. The yield of the finished product is 10 per cent of the raw product. Samples of cloth made from this material are said to show that it is suited to making a large variety of fabrics. Leading German merchants, spinners, and bankers have subscribed capital for the manufacture of the new cloth. They call attention to the fact that Napoleon's embargo on sugar resulted in developing their great beet-sugar industry, and predict that a similar development will take place in the cloth industry. One point in favor of the typha is that it can be grown on land not needed for cultivating other crops and it can be harvested from June until frost.

BATTLE SOUVENIRS MADE BY WOUNDED SOLDIERS

That the French wounded soldiers are using great ingenuity and skill in making all sorts of souvenirs and toys now that they are disabled, and that the relief bodies in charge of this work have carefully systematized even the details of their duties, is shown in the accompanying illustration. These articles are all made from material found on battle fields. The paper knife and picture holder are constructed of discharged German shells to which discharged bullets have been refitted. Some of the bullets bear dents received in flight. Each cartridge is decorated

Picture Holder, Paper Knife, and Napkin Ring Made by Wounded French Soldiers from Discharged German Shells; Also Identification Card Which Gives Personal Data Regarding One of the Makers

with a button taken from a German uniform. The knife blade and rear legs of the holder are made of brass cut from larger shells. The napkin ring, on which the likeness of a cannon has been inlaid in black and gilt, is made from an aluminum ring which was part of the time fuse of a large shell. A personal touch is given to each of the thousands of articles made in this way by accompanying each one with a card bearing a number, the name and regiment of the maker, in what battle he was wounded, and on what date.

¶ It is reported that Orville Wright will not renew his British patents on naval and military aeroplanes, which expire soon, but will present them to the British government. This will permit the machines to be manufactured in Great Britain without the payment of royalties.

HUGE MAP ILLUSTRATES SIGN ON BUILDING

A huge map of the central portion of California has been used with telling effect as a part of a sign, six stories

Map, Three Stories High, on Side of Office Building of a Gas and Electric Company, Which Shows the Corporation's Sources of Power and the Great Number of Towns and Cities Which It Serves

high, which occupies the side of a conspicuous building in a California city. In this structure are located the home offices of a large gas and electric company whose lines form a network that covers many counties to the north, east, and south of San Francisco. The big map indicates all of these lines, and also shows all the sources of power controlled by the company and the many cities and towns which are served by it. Above and below the map are statistics relating to the business.

¶A steward recently saved the life of a partly suffocated sailor, rescued from the burning steamer "Congress" on the west coast, by putting his mouth to the sailor's mouth and acting as a human pulmotor.

"TEAR" SHELLS EMPLOYED BY GERMAN FORCES

From British sources come accounts of a new and much dreaded German weapon of war that has apparently been used with considerable success for offensive purposes during recent operations in the western theater. It is the lachrymal, or weeping, shell, a projectile which upon bursting fills the atmosphere with a substance that severely irritates the eyes upon coming in contact with the moist tissue. It provides a means of blinding the enemy forces and rendering them incapable of resistance when an attack is made upon a position. Seemingly the use of the shell is restricted, as is that of gas, to periods when the wind is favorable. Otherwise the Germans themselves would be blinded upon seizing and occupying an allied trench. Acrid sulphur oil, which is released when a fresh onion is cut, is a common example of a tear excitant. The Teutons, however, are using a substance of great strength, possibly red pepper. When the latter is burned it gives off a volatile alkaloid that acts as a powerful irritant.

FRUIT-JAR WRENCH IS NEW ACCESSORY FOR KITCHEN

Even though it may have been sealed for some time, little effort is normally required in removing the cover of a fruit jar with a new wrench that has lately been devised for that purpose. The tool is of substantial metal con-

The Wrench Grips a Fruit Jar Firmly and Affords Good Leverage so That Removal of the Cap can be Accomplished without Needless Effort

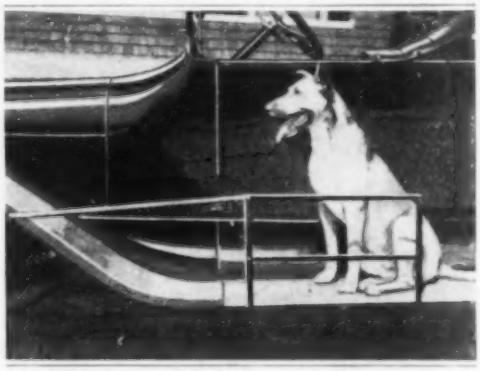
struction and consists of an open, circular band, faced with a rubberized material, to which a spring handle is riveted. By slipping the device over a jar and gripping the handle firmly with the right hand, the vessel is held securely and without danger of breakage while the other hand is used in turning the cap. The leverage afforded by the wrench materially lessens the effort usually required in performing such operations. The device is equally convenient as a help in sealing jars tightly when one is canning fruit.

DRY-MOUNTING ROLLER WITH HEATING COIL

Among recent Canadian patents there is an electrically heated roller for mounting photographs. Except that it is intended to be connected with a lighting socket, and has a flexible cord projecting from its handle for that purpose, the appliance is not of unusual appearance. The heating element consists of a resistance wire coiled about insulating material within the roller and connected with wires extended to it through the tubular forks of the handle. As is doubtless apparent to photographers, both amateur and professional, the device is employed when dry-mounting tissue is used.

RUNNING-BOARD RAIL FOR DOG MOTORIST

In many family outings which are enjoyed in automobiles it is not possible or practicable to let the family pet, the dog, share. Frequently the seats are crowded or there are other reasons for not allowing the animal in the car. When this difficulty confronted a Pasadena motorist, who owns a fine dog, he devised a guard rail which he fastened to the running board next to the driver's seat. It is made of steel strips, ¾ in. wide, which are curved at the lower ends and fastened to the under side of the running board with rivets. A brace extending to the front fender helps hold it in place. The dog rides safe and contented inside this guard, whereas formerly, while trying to keep his footing here, he was thrown into the street more than once.



COURTESY OF THE MOTOR AGE

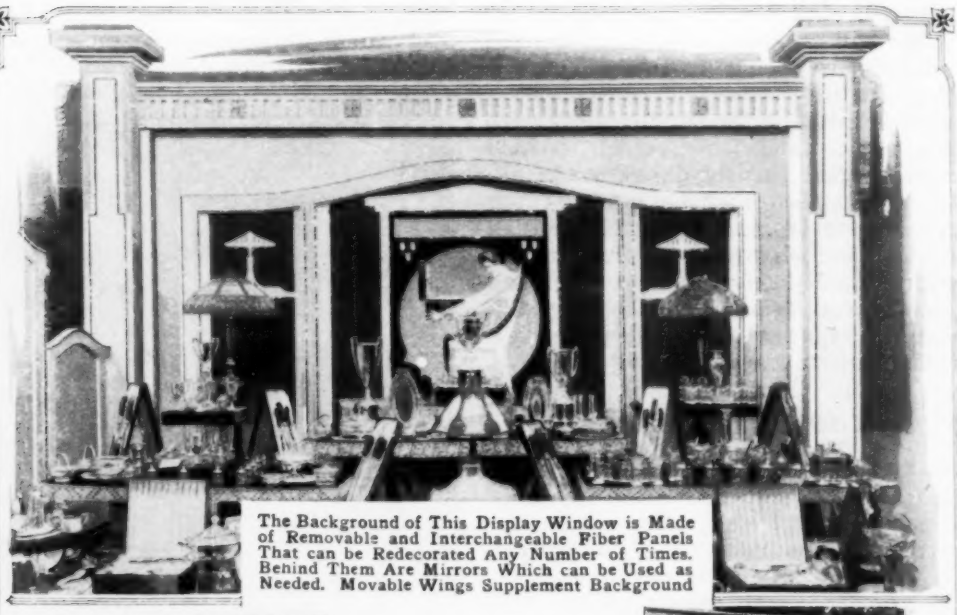
A Simple Guard Rail Made by a California Motorist to Enable His Dog to Ride in Safety on the Running Board

MOTOR CAR IS EMBLEM FOR MODERN WEATHER VANE

The likeness of an automobile has been added to the varied list of emblems which have adorned weather vanes for so many years and includes cocks and various domestic animals. On this "up-to-date" weather vane the automobile serves as the tail of the arrow. The entire article is cast in metal and measures 30 in. in length. The point of the arrow and the automobile are covered with gold leaf, while the remainder is painted red and black.

New Weather Vane Which Promises to Be as Popular as the More Familiar Type Adorned with the Likeness of a Cock or Domestic Animal

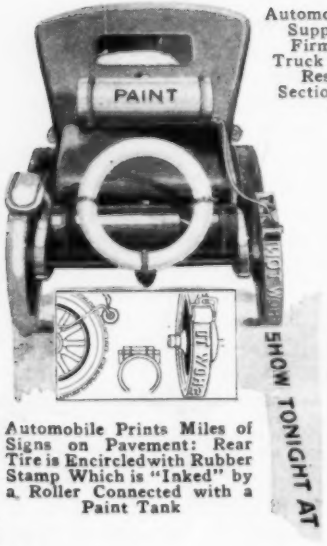
NEW AND INGENIOUS ADVERTISING METHODS



The Background of This Display Window is Made of Removable and Interchangeable Fiber Panels That can be Redecorated Any Number of Times. Behind Them Are Mirrors Which can be Used as Needed. Movable Wings Supplement Background

Automobile-Supply Firm's Truck with Body Resembling Section of Huge Tire

Gasoline Station and Display Room Fitted Up Like Quaint Cottage: A Little Attendant Gives Each Customer an Ice-Cream Cone



Automobile Prints Miles of Signs on Pavement: Rear Tire is Encircled with Rubber Stamp Which is "Inked" by a Roller Connected with a Paint Tank

Car, Armored with Genuine Sheet Steel, Serves as a Strong Advertisement for Automobile Insurance

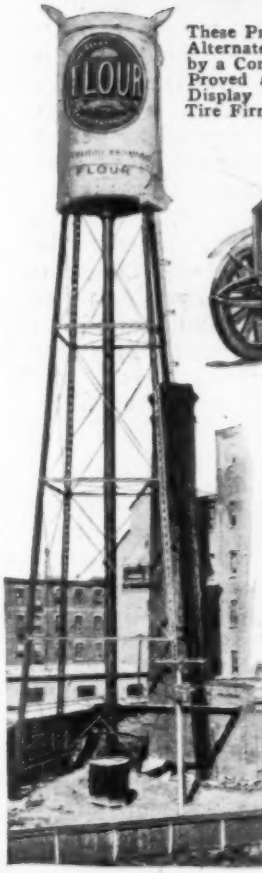
THAT HAVE WON TRADE IN VARIOUS REGIONS

These Pneumatic Rubber Manikins, Alternately Inflated and Deflated by a Concealed Air Pump, Proved an Amusing Display for a Tire Firm

Phonograph 14 Feet High, Which can be Heard a Great Distance, Mounted on a Car Having Front Wheels and Ornaments Resembling Phonograph Disks

PHOTO BY WORLD FEATURE SERVICE

The Navy is Making Successful Appeal for Recruits with This Small-Sized Land-Going Battleship. Its "Crew" has Distributed Recruiting Literature in Many Cities



Steel Water Tank, with 40,000 Gallons' Capacity, Shaped and Painted to Resemble Exactly the Product of the Flour Mills to Which This Tower Belongs

The Artistic Supports at Either End of This Outdoor Sign are Crowned with Bird Houses

Automobile Attachment That Gives Driver Directions, as He Rides along a Given Route, by Automatically Feeding a Printed Tape Past an Opening. Tape Also Carries Ads of Places on the Route

PUSHCART USED AS FREIGHT TRAILER FOR MOTORCYCLE

One of the latest uses to which a motorcycle has been put is hauling a trailer filled with farm produce. A California truck grower used an ordinary two-wheeled pushcart as a trailer by tying the handle to the luggage carrier at the rear of the motorcycle. It proved a very easy and time-saving way to haul vegetables, and other produce, to market. Sometimes loads weighing as much as 500 lb. are carried in this cart.

Hauling a 500-Pound Load of Almonds to Market in a Novel Motorcycle Trailer

SOUNDPROOF QUALITIES OF PRESSED FIBER

During a recent investigation, which included a study of the transmission and absorption of sounds, various materials were tested as to their soundproof qualities. A whistle of special design, producing a given note, was placed in one of two adjoining rooms and a resonator to receive the sound was set in the other. By closing the doorway between the two with pressed fiber, ¼ in. thick, it was found that practically all sound was shut out from the second room; ¼-in. cork board stopped 80 per cent of the whistle's note, and three layers of cork stopped 92.6 per cent. The transmission of sound at a constant pitch, it appears, depends on the porosity, density, and elasticity of the material. Porous bodies transmit sound in much the same proportion as they transmit air. These tests indirectly suggest numerous uses for pressed fiber as a building material.

DIMMER GIVES LIGHTS ANY BRIGHTNESS DESIRED

A controller, by means of which a motorist can dim his automobile lights to just the extent that conditions demand, or shut them off entirely, is being manufactured by a Grand Rapids, Mich., concern. It consists of a small rounded metal case containing a variable resistance coil from one end of which projects a sliding contact, having a wooden handle. By drawing the handle in or out, the amount of current fed to the lamps can be regulated at will. This accessory can be attached to the steering post or dash. A change from one type of electric bulb to another does not render it ineffective, and additional lights can be placed under its control without altering it.

NEW METHODS EMPLOYED IN PRECISE LEVELING

Those in charge of a Coast and Geodetic Survey precise-leveling party operating in Michigan have found in practice that very good results are to be obtained by mounting a tripod on

Adding Machine Supported on a Metal Frame Secured to a Motor Velocipede: With It the Rod Readings are Listed as They are Called Out, Instead of being Scribbled on a Memorandum Pad and Later Transcribed, as has been the Practice in the Past

This Shows How the Tripod is Mounted on a Railway Motor Car. The Latter Weighs About 350 Pounds and Forms a Very Solid Base for the Instrument. This Plan Enables Fast Work in Precise Leveling and is Employed by the Coast and Geodetic Survey

A Large Umbrella is Used to Shade the Instrument When the Observer Is at Work: This is Done to Prevent the Instrument from being Thrown Out of Adjustment by the Direct Heat of the Sun

the frame of a railway motor-velocipede car. When this is done an instrument remains in better adjustment while being used than when it is carried by hand from station to station, as is customary. The great difficulty found in getting a tripod to stand on the ground in such a manner that the height of the instrument will remain absolutely fixed, is obviated by employing this plan. The results that have been obtained by using a car as a mounting are said officially to be of probably greater accuracy than those gotten by the old methods. When the benefits of the scheme became assured, the plan was adopted by other parties engaged in precise leveling in Maine, Florida, and Arkansas. The chief of the geodetic division expresses the opinion that the system is one which might be employed to good advantage when railways are running lines of levels, whether precise or of a lower grade. Another improved method now being followed is the use of an adding machine instead of an ordinary note book for tabulating the records of observations. With the aid of this device, rod readings are taken down on the machine and printed as they are called. A bracket holds the instrument at a convenient height before a seat on one of the railway motor cars used by the party.

¶It is reliably stated that for every man in the armies at the front, three men are needed in munition factories to keep him supplied with ammunition.

ARTISTIC AND WELL-BUILT STREET-TRAFFIC SIGN

A traffic signpost has been erected by the town of Shenandoah, Ia., at the intersection of two important streets, which is substantial and at the same time pleasing in design. It is composed of a short four-sided pillar finished in stucco, which rests on a heavy stone pedestal. The top of the pillar serves as a flower box in which flowers and vines have been planted. A metal post stands in the center of the flower box and supports two metal street signs set parallel to their respective streets. Above the signs is a large globe that shows a red light at night. A hand, painted on each of the four sides of the pillar, indicates the direction the traffic should take.

HANDY COIN HOLDER FOR NICKELS AND DIMES

Such vexatious delays as sometimes occur in trying to extract a coin from one's purse with which to pay car fare, can be avoided by using a recently devised coin holder. It consists of a metal cylinder, about three inches long, and oval in cross section. Each end is cut off on a slant, and in the side, at each end, is a slot, one for dimes and the other for nickels. When a coin is inserted in a slot it pushes back a spring-held follower that serves to keep all the coins pressed out toward the end at which they were inserted. An opening in each end exposes the edge and part of the face of each outermost coin. To remove one of the pieces it is only necessary to hold the device in one hand and press the thumb forward against the coin. This will slide it through the slot and into the grasp of the thumb and index finger.

ICE-CREAM-FILLED BANANA IS NEWEST CONFECTION

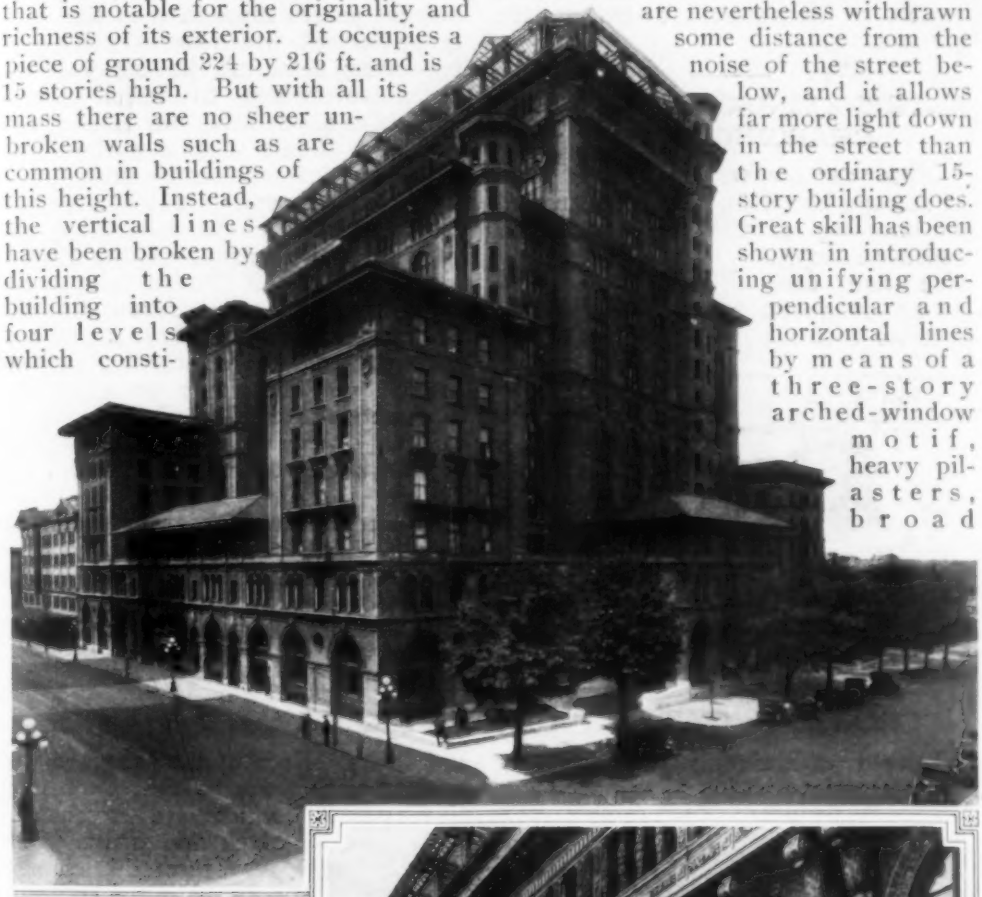
A substitute for the almost universally popular ice-cream cone has been found in the form of a cored banana, stuffed with ice cream. After the heart of a banana has been removed by a long slender corer an especially designed machine, which need occupy but little space on a dealer's counter, is used to fill the hollow fruit by pressure. The banana is inserted into a tightly fitting tube, and a small cylinder, the size of the hole in the fruit, is filled with cream. By turning a crank and cam the frozen filling is forced by a plunger into the banana. The peel serves as a very satisfactory and sanitary wrapper. Many persons are fond of dishes in which this fruit is combined with ice cream, and so the new confection may prove quite popular.

Simple Machine with Which Cored Bananas are Filled with Ice Cream: By Turning the Crank Ice Cream is Forced from a Cylinder into the Fruit by a Plunger

¶ Artistically decorated bowls of corrugated paper are set within the brass finger bowls used in the dining cars on an eastern railroad. A new lining is used for each guest.

ARTISTIC FEATURES FOUND IN NEW CANADIAN HOTEL

There has recently been completed in Vancouver, B. C., a beautiful hotel that is notable for the originality and richness of its exterior. It occupies a piece of ground 224 by 216 ft. and is 15 stories high. But with all its mass there are no sheer unbroken walls such as are common in buildings of this height. Instead, the vertical lines have been broken by dividing the building into four levels which constitute four steps that rise impressively one above the other to the top of the central portion of the building on which the roof garden is situated. The architect seems to have given great thought to producing this cumulative effect, which is well shown in the illustration. But it is not alone from the artistic standpoint that this arrangement has advantages, for it makes possible a large number of outside rooms, which are nevertheless withdrawn some distance from the noise of the street below, and it allows far more light down in the street than the ordinary 15-story building does. Great skill has been shown in introducing unifying perpendicular and horizontal lines by means of a three-story arched-window motif, heavy pilasters, broad



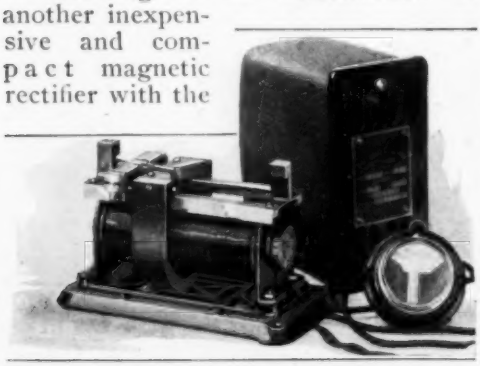
An Impressive Feature of This Railway Hotel Is the Cumulative Effect Produced by the Various Steps Which Rise One above the Other to the Roof Garden at the Top

A View of the Upper Stories, Showing the Richly Embellished Cornice and the Massive Buffalo and Moose Heads. The Upper End of the Three-Story Arched-Window Motif is Shown, and There Is Also a Glimpse of the Handsome Latticework Surrounding the Roof Garden

eaves, etc. One of the features which lends richness to the exterior is the heavy cornice which is supplemented by a row of massive moose and buffalo heads. The fire escapes have been concealed in hexagonal towers at the corners.

ALTERNATING-CURRENT CELL-CHARGING OUTFIT

Motor-car owners, and other users of storage batteries, will be interested in knowing of the introduction of another inexpensive and compact magnetic rectifier with the aid of which a common house-lighting alternating current can be used for charging purposes. To reduce the line voltage for this function, a special step-down transformer is employed. The current passes through it to the rectifying element, which consists of a master-spring armature having two opposed subsprings to which copper electrodes are attached for making and breaking circuit with a carbon one. These two instruments are mounted on a metallic base and housed in a durable case. In addition to controlling the vibrations of the armature, the magnet serves as a circuit breaker to open the charging circuit and prevent the discharge of the battery through the rectifier in case the alternating current should be shut down unexpectedly. The rectifier is self-starting, making it safe to charge a battery during the night when it cannot be watched.



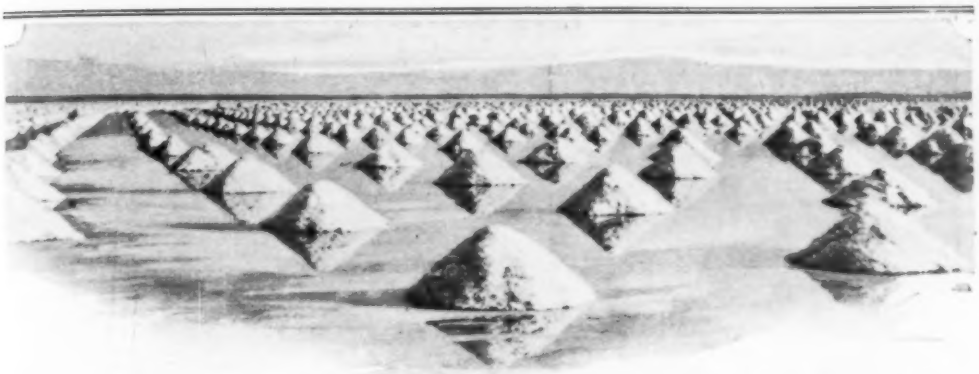
Light, Compact Storage-Battery Charging Outfit That may be Attached to Ordinary Alternating-Current Circuit

¶An airman has been granted permission to carry a bag of mail from New York to Chicago. The trip will be undertaken as an experiment to test the feasibility of such an aerial mail route.

CROSSING GATES PAINTED BLACK AND WHITE

Instead of painting the gates at grade crossings white, as has been the common custom, several railroad companies are now painting them black and white. Each of the long arms is marked with wide stripes, or bands, which are alternately black and white. The purpose of this change is to make the crossing guards more conspicuous. Against a background of light-colored buildings or a light roadway plain white gates, even when closed, are sometimes unnoticed by motorists, and accidents result. But the checked or striped gates are almost sure to attract attention in any light. It is said that this change already has lessened the number of accidents at crossings.

One of Many Railroad-Crossing Gates Now Painted Black and White so That They will Be Conspicuous in Any Light and against Any Background



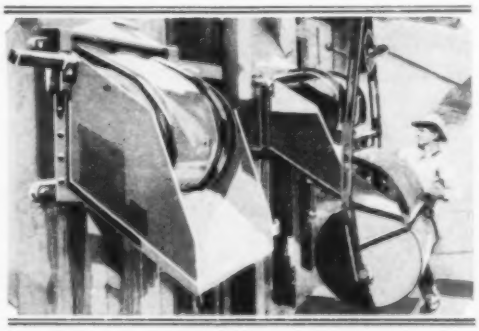
Thousands of Tons of Salt Scooped into Piles on the Floor of Saline Valley: It Is Ready to be Hauled in Wagons to the Loading Station and Carried over the Mountains to the Driers by Aerial Tramway

HARVESTING SALT WITH AN AERIAL TRAMWAY

By ALBERT MARPLE

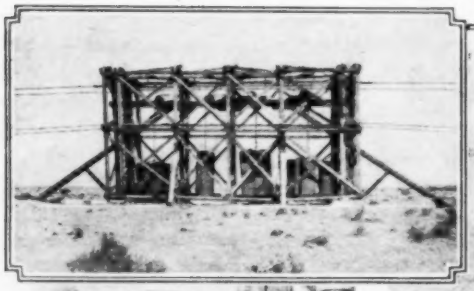
FROM an engineering standpoint, if for no other reason, the mammoth electrically operated tramway running from Saline Valley to Tramway, or Swanson, Calif., is a wonderful piece of work. This tram is 13½ miles long and it is used to carry salt from Saline Valley to the nearest railroad line. Saline Valley is located in Inyo County, about 15 miles from Owens Lake and 75 miles from Death Valley. It is reached through Lone Pine, the nearest settlement on a main railroad line, from which point a branch steam road runs to Swanson, the outer end of the tram.

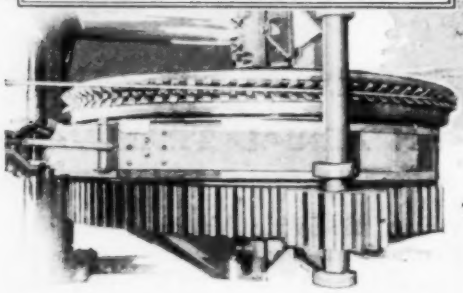
Since 1868 salt has been taken out of Saline Valley. First it was carried by burro pack train over a very narrow trail, then by wagon over an almost impassable road. The latter led to Big Pine, 60 miles from the valley, 40 miles of which was "dry," water for men and beasts having to be hauled along in tank wagons. It took 13 days to make a trip over this wagon road, 16 horses or mules being used, and the maximum load of salt consisted of eight tons. The elevation of Saline Valley is 1,000 ft. From the valley there are exits on but two sides—the pass on the east being 4,600 ft. high, and the two on the north being 6,600 and 7,700 ft., respectively. The region around the lake is rugged in the extreme.



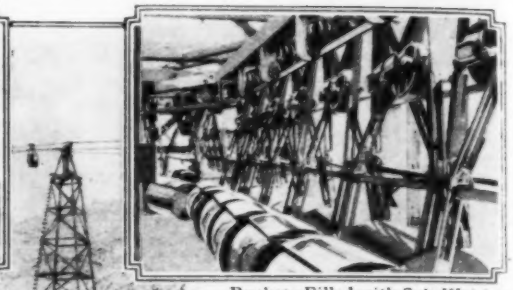
At the Loading Station the Salt is Discharged from Hoppers into the Conveyor Buckets, Each of Which Holds About 700 Pounds of the Product

The pack and wagon-train methods of carrying the salt soon became too slow, so this electric tram was decided upon, a high-powered electric line running near by making this possible. The building of this tram was no easy task. Many engineers were taken out to look over the ground and everything went well until they reached the summit and looked over into the valley—here they bucked. After all others had refused to undertake the job, White Smith, an aged gray-haired resident of that section, now living in Los Angeles, agreed to build the tram, and, assisted by his knowledge of the country, he succeeded. From the 1,000-ft. level of the floor of the valley the line runs up to and over the ridge of the mountains in a direct line between the salt fields and Swanson, this ridge hav-

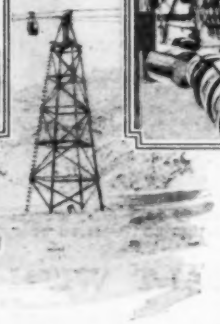




At the Top is Shown One of the "Tension" Stations Where the Load Wires are Stretched by Heavy Weights. Below Is One of the Gripping Drums Operating a Pull Cable



Buckets Filled with Salt Waiting to be Sent to the Driers: They are Dispatched at Intervals of About One Minute and Travel More than Five Miles an Hour



The Towers Supporting the Aerial Lines Vary from 12 to 150 Feet in Height

ing an elevation of more than 8,700 ft. On the opposite side of this mountain the line drops about 5,200 ft. into Swanson. Where formerly it took 13 days to carry eight tons of salt out of the valley, buckets containing 700 lb. of salt are run entirely along this tram in two hours and 20 minutes, these being run one minute apart and traveling at a rate of 500 ft. a minute. This tram works practically the year round, day and night, and estimating that it runs 20 hours each day, 11 months in the year, about 138,600 tons of salt would be taken out of the valley annually.

This tram cost more than $1,000,000 to build, and to operate it four 75-hp. motors are required. It was built by an average crew of 60 men in 22 months. It is what might be termed a four-wire system throughout. To convey both "coming" and "going" buckets there is a carrying cable and a pulling wire. The carrying, or load, wires are 1⅛ and 1¼ in. in diameter and stationary, having a breaking strain of 90 tons. These wires have their terminals at what is known as "tension" stations, located about 1¼ miles apart. One end of the wire is stationary, while the other, at the tension station, is attached to very heavy weights, the mission of which is to keep the line tight at all times, thereby taking up the slack created by stretching. The pulling wires are endless and are in relays. Between each two power houses, excepting the two at the summit, one of these endless pulling wires is located. The work of each of these wires is to catch a bucket as it enters its outside station and to pull it along the load wire until the station at the other end of the pulling wire is reached, whereupon the bucket is released and is sent forth to be carried by the next pulling wire. Upon releasing the bucket the pulling wire crosses over to the opposite load wire and upon the return trip occupies the same relation to that wire that it did to load wire No. 1 on the outward trip. On the return trips the pulling wire hauls empty buckets back to station No. 1 at the salt fields.

With the exception of the two stations at the summit, the four power stations are the same distance apart, and between them are 34 curved-rail, tension, and anchor stations, and about 150 timber towers, ranging from 12 to 150 ft. in height. The curved-rail stations are installed to eliminate a bend of more than 60° at points where the line runs off the ridge of a hill, because a greater bend causes crystallization in the load wire. At one stretch this line

rises 1,950 ft. in a distance of 4,400 ft., while at another there is a span of 2,200 ft., the center of which is 1,800 ft. above the bed of the cañon below.

A wonderful valley of salt is Saline Valley. It is more than 1,500 acres in extent and although the depth has not been ascertained it has been tested down more than 30 ft., and thus far nothing but salt has been encountered. It is claimed that there are 90,000,000 tons of this material in sight. Estimates show that a foot of this salt will average 120,000 tons per acre and to remove a foot of this valley or "playa" at a rate of 20 tons an hour would take at least 30 years. Scientists claim that this salt is being deposited almost as rapidly as it is being removed at this time.

At This Point the Line Ascends 1,950 Feet in a Distance of 4,400 Feet. Formerly It Took 13 Days to Make the Journey by Wagon. The Buckets Complete the Trip in Less than Two and a Half Hours

The harvesting of the salt is an interesting process. The first step is the flooding. For this work mountain water is secured from a 60-in. spring. This is carried to the playa in steel pipes, which may be moved to any part of the large field. This water, assisted by the moisture which comes from below, dissolves the salt for possibly a foot in depth, forming a sort of saturated solution, which, upon reaching this stage, sinks deeper into the salt flakes, leaving it in such a condition that the workmen may walk upon it in safety. Within a few days the intense heat of the valley sun causes evaporation of the water in the uppermost inch or so of salt, after which the salt is as white and pure as snow and is ready for harvesting.

An automobile plow has been arranged for the gathering process and as this travels back and forth across the fields of white it collects the upper inch of salt and arranges it in long, even rows, these later being piled in "stacks" by workmen with shovels. Later the salt is loaded upon wagons

Summit of the Mountain Range: Highest Point on the Tramway. The System was Constructed at a Cost of About $1,000,000 and Now Carries Thousands of Tons of Salt Out of the Valley Annually

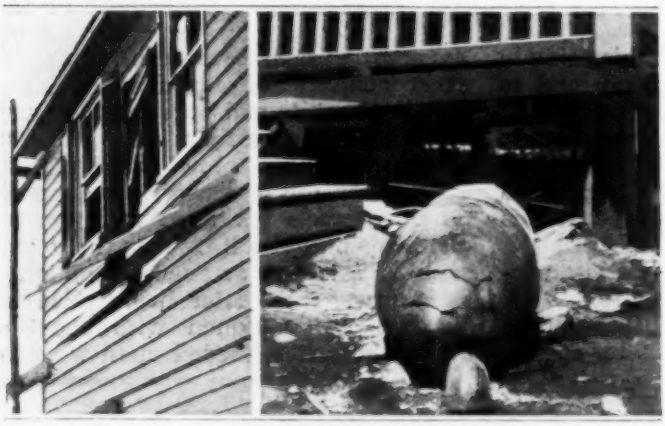
holding 1,200 lb. each, and is conveyed to one of the loading stations on the field, after which it is taken in small rail cars to station No. 1 and dumped into the tram buckets. Once in these buckets, it needs no more attention until the opposite end of the tram is reached, where, in a very few seconds, it is emptied.

The empty buckets are started at once upon the return trip to the valley, while the salt, just emptied, is rushed to the drier, electrically operated, and from there to the packing department, where it is placed in boxes and cartons ready for table use. Except for being dried, the salt is used just as it is taken from the field.

The trip from Swanson to Saline Valley is now made by workmen and visitors alike by the "bucket route." The ride is a thrilling one from start to finish, but the workmen and the bucket riders take it without so much as a thought of danger. Provisions for the camp are carried over the tram.

FIRST SHOT FROM BIG GUN ACCIDENTALLY HITS HOUSE

A strange course was followed by the first shot which was fired recently from the new 16-in. gun at the government proving grounds at Indian Head, Md. The projectile passed through a plate of armor 13 in. thick, and then into a high embankment of sand. But it did not stop here as the officers in charge had reason to expect. Instead it accidentally struck another shell buried in the sand and was deflected into the air and crashed through a frame dwelling a mile away, occupied by an employe of the proving ground. Those who were in the house at the time narrowly escaped injury. The missile is 4 ft. long, 16 in. in diameter, and weighs more than a ton.

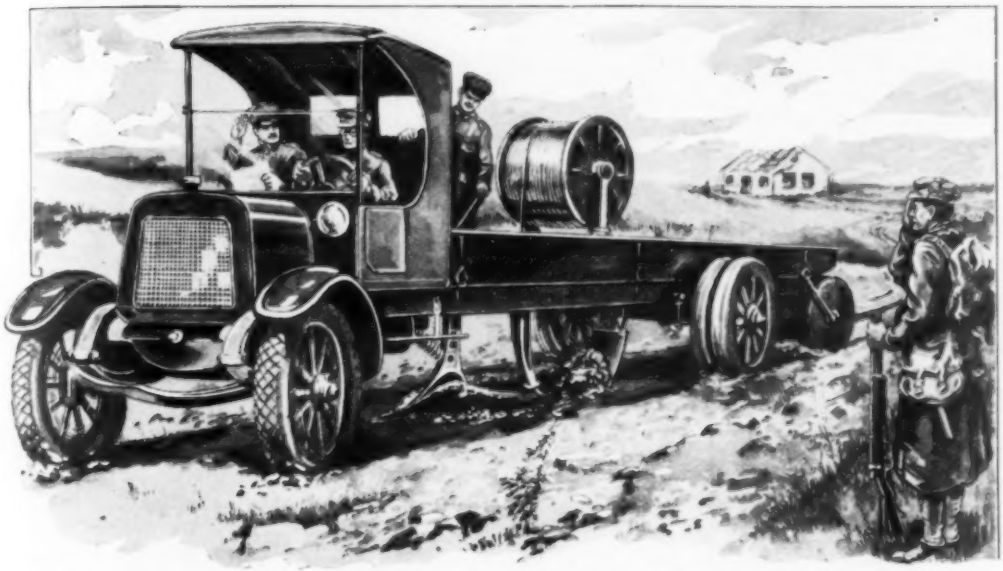


On the Right Is a Sixteen-Inch Shell That was Fired on the Government Proving Grounds at Indian Head, Maryland. It was Deflected from Its Course and Crashed through the House Shown on the Left

COMPASS MADE UNRELIABLE BY BIG CARGO OF STEEL

The officers of the British steamship "Berwindale" were astonished, shortly after that vessel sailed from Baltimore recently, to find that their compasses were acting strangely. The delicate needles began to revolve and jiggle about in a most uncertain manner and at times even pointed due south. After the ship had proceeded 162 miles it was decided that it could not continue on to Liverpool with safety. By making observations by the stars and by sounding, a safe return course was determined upon and the vessel brought back to its starting point. The trouble was caused in part, at least, by the fact that the ship's cargo consisted of steel rails and billets, which affected the magnetic needles, though this would not account for the violence of the disturbance. On reaching port the necessary adjustments were made, and the vessel was able to sail again the following day.

¶The navy is to have four new battle cruisers, each 850 ft. in length. Bids for their construction were recently opened at Washington.



A Furrow is Opened, the Cable Laid, and the Trench Subsequently Filled and Rolled in a Single Operation as the Truck is Driven

SPECIALLY EQUIPPED TRUCK LAYS COMMUNICATION WIRES

An Illinois inventor has lately developed attachments for a motor truck which enable telephone and telegraph cables to be extended underground between military positions expeditiously and with a minimum amount of labor. The equipment can be applied to standard trucks at comparatively low expense. An adjustable plow that will cut furrows of different depths is fixed to a car immediately back of the driver's seat. A steel tube, through which a cable can be passed from a large spool held in a cradle provided on the floor of the machine, is set a number of inches behind the plow and in alinement with it. Following this, a spreader plate is arranged to fill the plowed earth back into the furrow, while at the extreme rear there is a heavy roller that completes the work. Thus communication wires are laid and covered in a single operation by merely driving the truck along at a rate of two or three miles an hour and keeping the plow in proper adjustment. Two or three men are all that are required in operating the machine, and it is believed that with the equipment that number can accomplish substantially the work of more than a score.

TRADING CENTER MARKED BY LIGHTED WHEEL

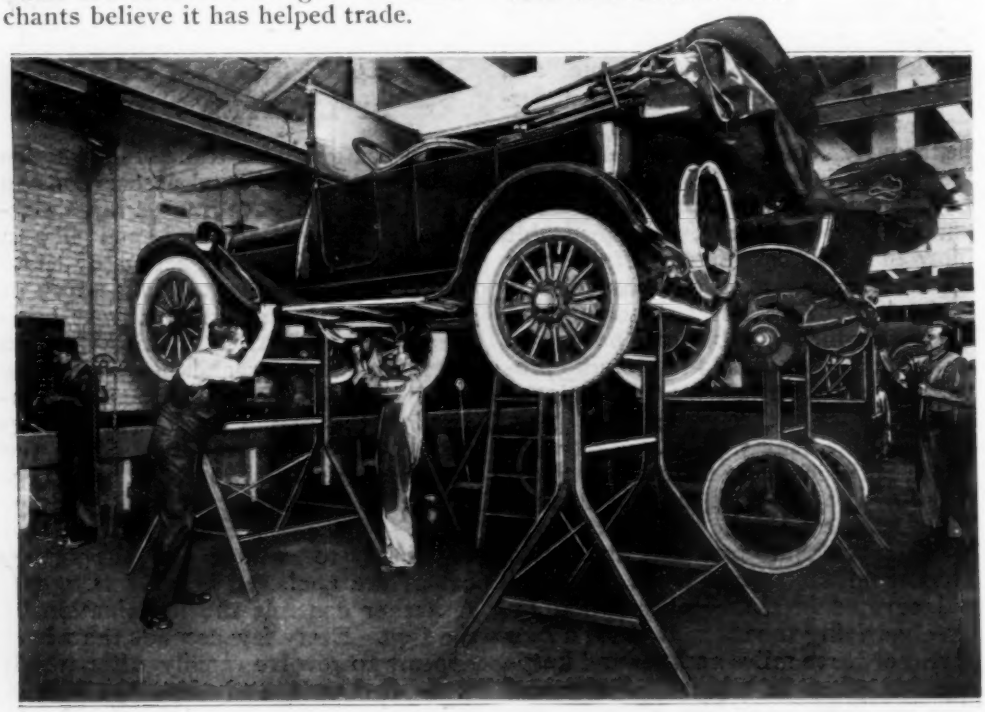
Believing that "trade follows the light," two merchants' associations in Salt Lake City have hung a large electrically lighted sign, shaped like a wheel, over the intersection of State Street and Broadway, as a feature of a persistent campaign to attract business to that district. This wheel is 19 ft. in diameter and bears but one brief legend, "Shopping Center," encircling the hub, which itself is suggestive of the same idea. Since the emblem weighs 1,200 lb., it was necessary to exercise great care in hanging it securely, particularly as the two buildings to which its supporting cables are anchored are 192 ft. apart. A flasher controls the illumination of the sign. Every few seconds the wheel appears to revolve rapidly, after which it is darkened and then the words "Shopping Center" are brightly illuminated. Over three hundred 12-watt

Illuminated 19-Foot Wheel Which Hangs at State Street and Broadway in Salt Lake City to Attract Shoppers

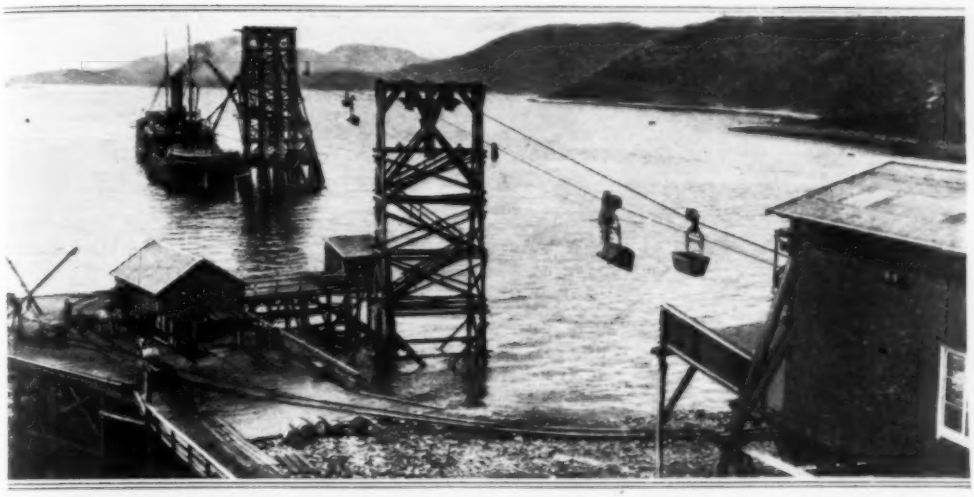
bulbs are used in the sign. The merchants believe it has helped trade.

SIX-FOOT SERVICE STANDS SUPPLANT GARAGE PITS

One of the best equipped garages in Los Angeles has eliminated repair pits entirely and uses instead service stands on which the automobiles are placed when under-side repairs or adjustments are to be made. This arrangement gives the mechanics much more room in which to work and saves time by dispensing with the use of a movable electric light so necessary in a pit. The stands are made of channel-iron sections split at one end, the two halves being spread apart to serve as legs. The legs are doubly trussed and two heavy truss rods are placed across the top. The cars are hoisted to these rests without difficulty by means of a heavy block and chain rigged on a traveler; they rest on their axles when in position, with the running boards 6 ft. above the floor. With this arrangement it is possible for two or even three men to work on a car at once and so save considerable time.



A Garage Which Has No Dark, Cramped Repair Pits, but Hoists Its Cars onto Service Stands, Giving the Mechanics Plenty of Room and Light in Which to Work



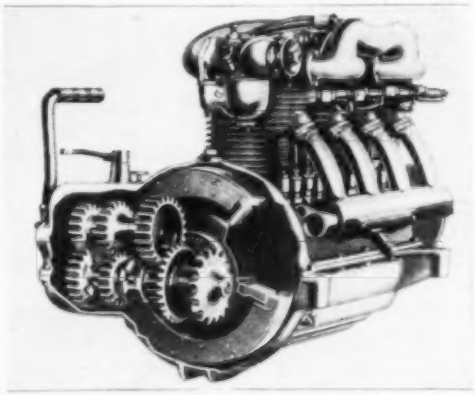
The Buckets Dump the Concentrated Iron Ore into Hoppers That Feed Chutes Extended from the Outer Tower into the Holds of the Ships

AERIAL RAILWAY IS USED IN LOADING SHIPS

Ore vessels are loaded some distance from the shore at Narvik, Norway, with the aid of an aerial tramway. The reason that this system is employed is that the beach slopes very gradually, making the distance to deep water considerable. Therefore it was considered more economical to erect a cable line than to construct a long pier at which freighters could berth. The outer tower is 755 ft. from the ore-dressing plant on shore, and at that point the water is sufficiently deep to accommodate steamers of about 6,000 tons. Concentrated ore is discharged from the conveyor buckets into hoppers and directed through chutes into the holds of the ships.

UNIT POWER PLANT ADOPTED FOR MOTORCYCLE

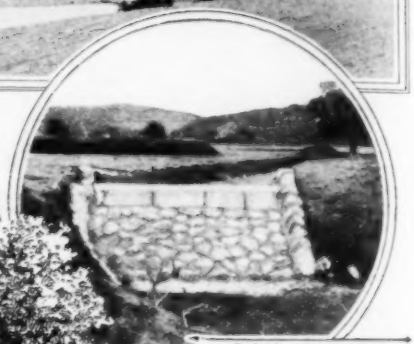
Motorcycle enthusiasts will be interested in a new unit power plant that is being built into the 1917 models of one of the standard machines. It is of the automobile type and consists of a four-cylinder, long-stroke motor with three-speed transmission. The latter is of the sliding-gear type and housed compactly in the rear of the motor base. A large multiple-disk clutch, incorporated in the flywheel and running in oil, is employed. The control is placed in foot levers that operate the clutch and brake, while the provision of an interlocking gearshift makes it impossible for the speed ratios to be changed without first releasing the former. This does away with the danger of damaging the transmission through improper manipulation. Although the engine parts are necessarily smaller than those of a twin-cylinder motor, they are arranged so as to be conveniently accessible, an important thing from the owner's standpoint.



Sliding-Gear Transmission Housed in Motor Base and Multiple-Disk Clutch Incorporated in Flywheel Are the New Features in the Power Plant of a Four-Cylinder Motorcycle

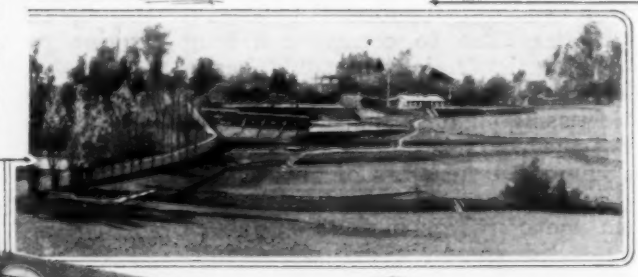
AMERICA'S ATTRACTIVE COUNTRY CLUBHOUSES

Many Los Angeles and Pasadena Players Frequent the 18-Hole Course of the Annandale Golf Club. The Building, a Rambling, Roomy Structure, Commands a Splendid View of the Mountains



Cobblestones and Cement Preserve a Natural Drain Extending through the Annandale Links, Saving the Course from Erosion

Flowers and Shrubbery Surround the Inviting Home of the Claremont Country Club, Which Is But a Few Minutes by Motor from Oakland, Berkeley, and Piedmont, California. Right: Looking from Eleventh Tee across Creek Hazard toward Clubhouse, Tenth, and Eighteenth Greens



Inviting and Hospitable Quarters of the Midwick Country Club a Few Miles East of Los Angeles, at Alhambra. The Building is Constructed of Reinforced Concrete and is Well Arranged for the Accommodation of Members and Their Guests. Adjacent to It Is an Interesting 18-Hole Golf Course

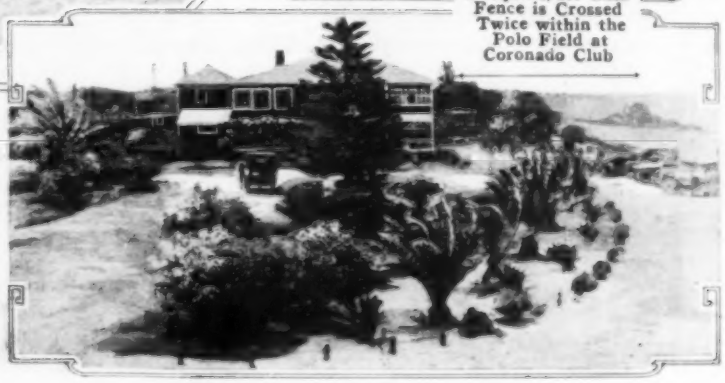
AND SOME OF ITS BEST-KNOWN GOLF COURSES

This Is a Natural Hazard and is Encountered in Playing the Fifth Green on Point Loma Links. The Embankment Is 15 Feet in Height and the Semicircle 100 Feet in Diameter

The Point Loma Golf Course at San Diego Has One of the Finest Seats on the Coast. The Building Is of Spanish Colonial Architecture and Is Imposing in Appearance. It Overlooks the Bay and Commands a View of a Beautiful Undulating 18-Hole Course Extending to the Water Front. Palm-Covered Sunshades Like the Above Are Resting Places Where Cool Water can be Found

Racing, Polo, and Golf Find Many Devotees at the Coronado Country Club, Coronado, California. The Organization is Allied with the United States Golf Association and Supports a Magnificent Stretch of Land Rounded on Three Sides by Water. The Clubhouse Has Large Sun Porches and Overlooks the Bay and Ocean. Views of It are Shown Above and at the Right. A Track, Polo Field, and 18-Hole Golf Course Are Adjacent

Niblick Shots Are Frequent, for This Fence is Crossed Twice within the Polo Field at Coronado Club



COMBINATION BATHTUB AND TRUNK

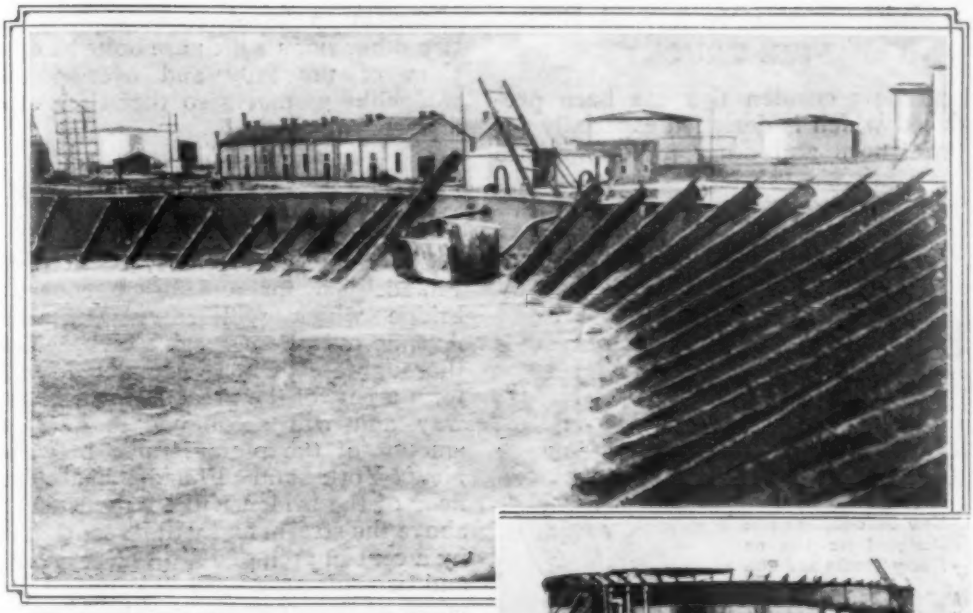
A new invention, which is particularly adapted for the convenience of campers, soldiers at the front, and others similarly situated, is a trunk which can be converted into a bath or laundry tub. The article is made of pressed steel and measures 45 in. long, 22 in. wide, and 22 in. deep. It is rounded at the corners and is fitted with handles and locking members. Casters can be screwed into sockets attached to the bottom, and a tray of light screening is provided which can be used when the container serves as a trunk. When used as a bath or laundry tub, a cork, or plug, is inserted from the inside into a vent provided at one end near the bottom. The outer end of the vent is threaded so that a hose can be attached to it if desired. Bracket legs which fold up against the bottom can be employed to support the article if it is desired to use it as a laundry basket, chest, or for other household purposes.

A Strong Steel Trunk That can be Used as a Bathtub: It Is 45 Inches Long and 22 Inches Deep. The Trunk Is Water-Tight, Has Rounded Corners, and is Lined with White Enamel

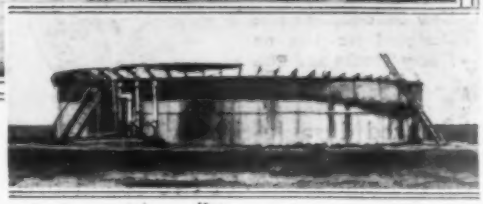
TROUPE USES UNUSUAL SET OF MUSICAL BELLS

A company of American bell ringers, which has been entertaining audiences in this country, uses a set of hand bells, the largest of which weighs 30 lb. The bells were cast especially for this troupe by a firm in England which has been established for centuries. When asked to make the largest of this set, the head of the concern declared that it was absurd and that in the whole history of his foundry hand bells of such size had never been cast, because no one could ring them successfully.

Troupe of Bell Ringers and Their Unusual Set of Hand Bells, the Largest of Which Weighs 30 Pounds



An Explosion Following a Stroke of Lightning Blew Off the Top of This Tank, Which Contained 170,000 Gallons of Gasoline Distillate: Interior View of Tank after Fire, Showing Oil Still Covered with Foam



One of the Tanks Where Fire has been Put Out: Eaves are Covered with Blankets as a Precaution to Smother Fire in Case It Should Reignite

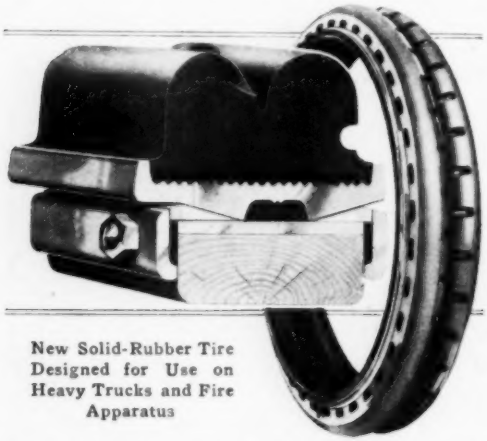
However, for $5,000 he was induced to fill the order, and then the strong and agile musicians showed him that they could use every one of the set, from the 1-lb. bell to the 30-lb., with extraordinary skill. In fact, many of the musical effects which these bell ringers produce result from the special ways in which they ring the metallic vessels. To support this set of instruments, which is very heavy, a sectional table was made having a frame of steel, with eight legs, which can be unscrewed, so that the whole can be packed in small space.

BIG OIL FIRE PUT OUT BY CARBON-DIOXIDE FOAM

A recent oil fire, which threatened great quantities of gasoline on the premises of a big refining company in Port Arthur, Texas, was extinguished within 30 minutes by using carbon-dioxide foam. This is said to be the first working demonstration, in that section of the country, in which this foam was used to put out oil fires. Certainly it is a very striking example of the effectiveness of the method. The fire was started by a stroke of lightning which struck one of the oil tanks. An explosion followed and presently three tanks, containing all told over 1,500,000 gallons of refined gasoline and gasoline distillate, were ablaze. All of the pipes, tanks, and conduits on the place had been equipped with foam-making apparatus and the flames were out in less than half an hour. In many, if not in a majority of oil fires, the loss is 50 per cent or more, while here it was less than one-half of one per cent of the value involved. This method of fighting oil fires was described some years ago in Popular Mechanics Magazine. Essentially it consists of mingling two solutions of such chemical composition that they produce carbon dioxide. This, combined with licorice or other solution having similar properties, quickly produces a very stiff foam. As it spreads out over the burning oil, carrying with it the suffocating gas, it soon smothers the flames.

NEW CUSHION TIRES FOR FIRE TRUCKS

A new cushion tire has been produced which is designed especially for fire trucks and other motor vehicles



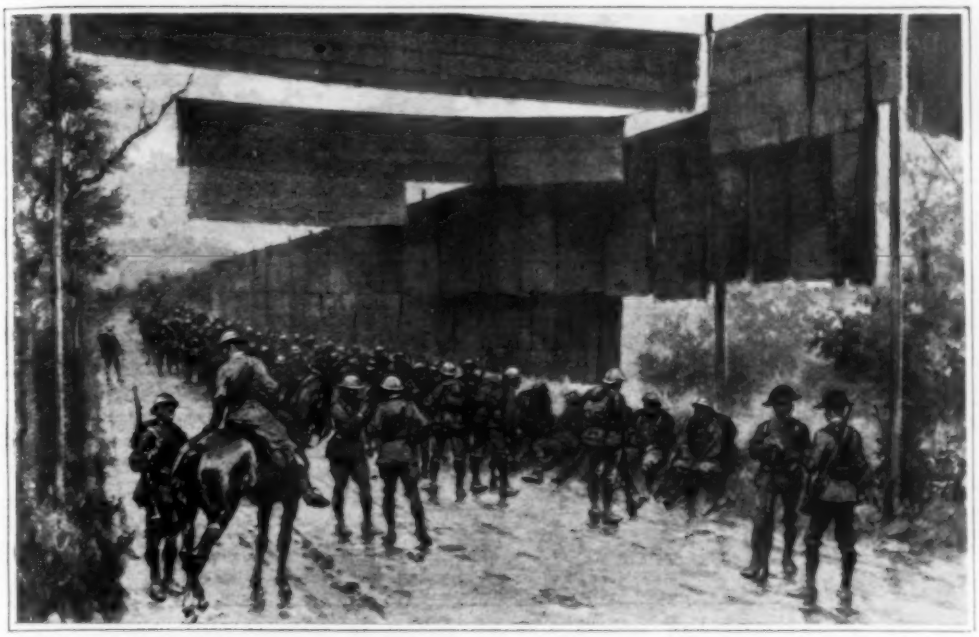
New Solid-Rubber Tire Designed for Use on Heavy Trucks and Fire Apparatus

that need durable tires which will not slip easily. When mounted, this tire has the appearance of two round tires set close together. The sides of the groove between these ridges are marked with staggered indentations to assist in giving the wheel traction. The rim to which the tire is fitted has heavy flanges to keep the rubber cushion from slipping off. A cross section of a wheel fitted with this new tire shows that the rim is thicker near the center than at the edges. This shape is provided so that rings can be inserted at either side between the felly and the rim. These rings, being thin at one edge, are driven in like wedges and make the rim secure. The locking of the rim to the wheel is completed by two other rings which are bolted to the sides of the felly and overlap the wedgelike members so that they cannot work out.

PHILADELPHIA TO BUILD COSTLY BRIDGE

Contracts have recently been let in Philadelphia for a $200,000 concrete bridge which will carry Bensalem Avenue over Pennypack Creek, which thoroughfare when completed will form a part of the great Lincoln Highway and will accommodate a large amount of the motor traffic between New York and Philadelphia. The floor of the bridge will be about 60 ft. above the stream and will be supported by a central arch of 100-ft. clear width, and two side arches, 60 ft. across. The width of the structure, center to center of railings, will be 78 ft. The bridge approaches, one of which will extend across a low level for a considerable distance, will be marked by barrel arches, to harmonize with the central arches. The bridge proper will be set off from the rest of the structure by massive pylons which eventually may be divided off into comfort stations, rest rooms, etc., and stairs may be erected in them to connect the two levels. The structure is to be given a warm buff color, which it is believed will present a pleasing contrast to the green of the surrounding landscape. Brown and yellow pebbles, which can be obtained in the vicinity, will be used in making the facing mixture.

Handsome Concrete Bridge to be Built by Philadelphia at a Cost of $200,000 to Improve Bensalem Avenue, Which is to Become a Part of the Lincoln Highway



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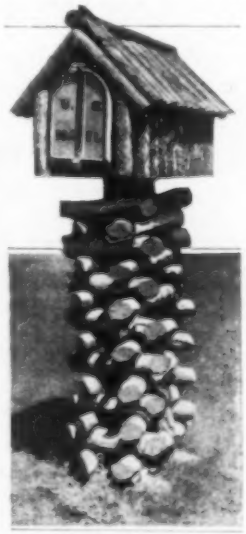
Straw Matting Hung by the Roadside to Prevent Italians Advancing to the Attack on Gorizia from being Observed by the Austrians

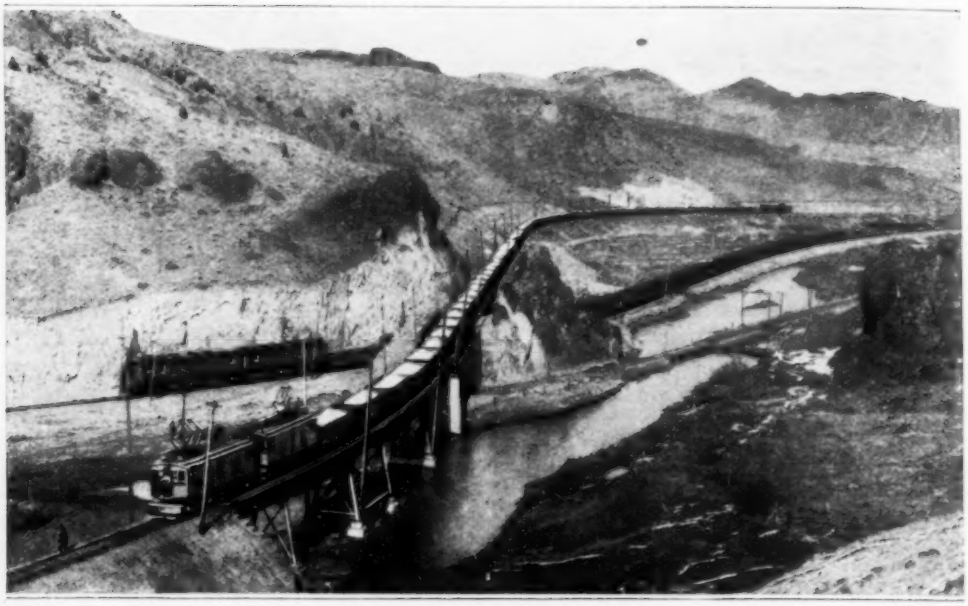
STRAW MATTING SCREENS ITALIANS NEAR FRONT

Novel evidence of the foresight of the Italian army officers and of their readiness to adapt themselves to new conditions is found in the straw matting which was hung up to serve as screens along one of the roads that lead to the point where the Italians made their successful attack upon the Austrians before Gorizia. The object of these thin shelters was to prevent the enemy from observing what troops, and how many, were being brought to the front. This road leading to the point of attack was, for the most part, sheltered on either side by trees and bushes, but it was in the gaps between these natural screens that the resourceful Italians hung the matting. It was supported on ropes stretched between telephone poles and other poles. In some places the screens were placed across the roadway several feet above those who passed beneath. There is something quite suggestive of the Chinese in these peculiar hangings.

RURAL MAIL BOX OF RUSTIC DESIGN

A rural mail box, rusty and dilapidated, such as one occasionally sees fastened to the top of an insecure post at a distressing angle, presents a sharp contrast to the mail box which a Minnesota farmer has erected in front of his home. The box itself, which is of the ordinary metal type, is inclosed in a miniature log cabin with a gable roof. The post supporting the box and cabin is surrounded with short sticks which have been laid crisscross. The rustic effect is very pleasing.



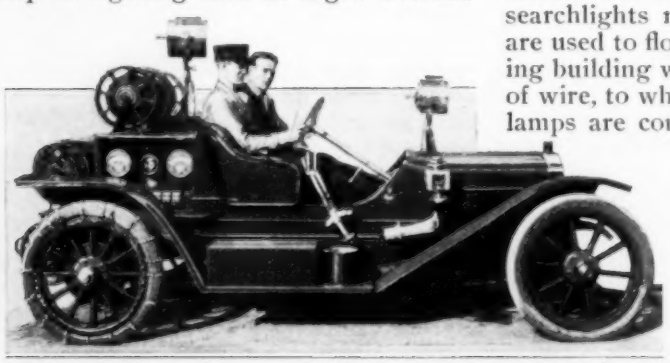


"MOTHER HUBBARDS" AT WORK IN MOUNTAINS

HEREWITH is doubtless one of the most unusual railroad photographs of its kind ever taken in America. It shows two of the powerful electric locomotives, now in use by one of the western transportation companies, crossing each other's paths in the mountains and drawing loaded freight trains of great tonnage. Each of these big engines is said to be capable of outpulling the best steam Mallet ever constructed. Single-handed either of them is capable of drawing a 2,500-ton freight train over a one-per-cent grade at a rate of 16 miles an hour. The engines are about 112 feet in length and hyphenated in order that they may take curves easily. Anyone at all familiar with mountain railroading needs but glance at the above picture to appreciate what electrification in the Rockies means. Ordinarily trains of the size of these would be pulled by two large compounds and possibly pushed by a third engine when negotiating mountain grades.

PORTABLE LIGHTING PLANT USED BY FIREMEN

To overcome the hazard and handicap of fighting fires at night without adequate illumination, the Salt Lake City fire department has been provided with a mobile lighting equipment. A motor car formerly used by the chief has been converted into an electric generating plant that supplies current for a battery of lamps. Two searchlights mounted on the machine are used to flood the exterior of a burning building with light, while four reels of wire, to which portable incandescent lamps are connected, are available for those working within a structure. The latter units provide much greater illumination than either pocket flash lights or the ordinary hand lanterns carried by firemen and may be used without danger of causing explosions when illuminating or some other gas is encountered. A dynamo mounted at the rear of the car is driven by the engine and supplies a steady, dependable flow of current.



Mobile Lighting Equipment Used by Salt Lake City Firemen When Fighting Conflagrations at Night

A NEW HOSPITAL FOR THE AMERICAN NAVY

By ALAN JAMES

WITHIN a year or so there will be added to the United States Navy a vessel as unique in its way as was the old "Vesuvius," the warship designed to throw dynamite instead of hurling projectiles. But, while the "Vesuvius" was an engine of destruction, this new ship will be a means of building up the bodies of men, a vessel of peace and comfort attached to our great fighting fleet—in short, the new hospital ship of the United States Navy, the first of its kind to be built in the world.

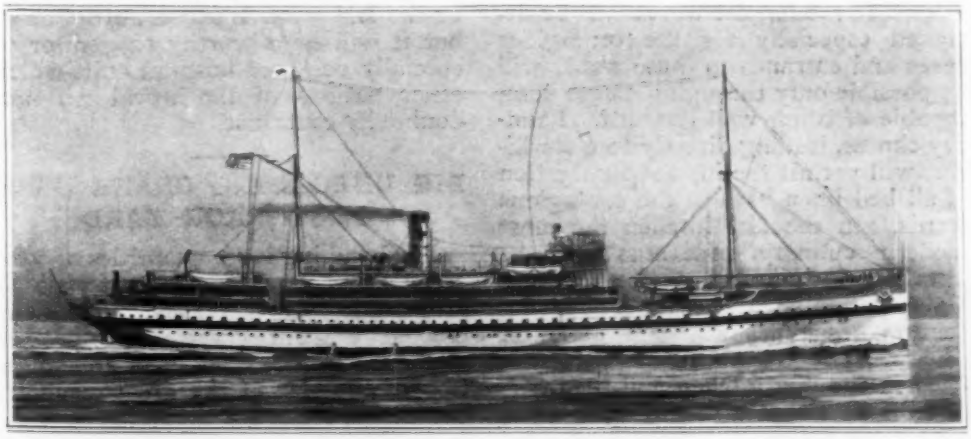
The hospital ship, as a class, is by no means new. Reports of our observers at the Dardanelles showed that there were about 50 allied hospital ships at work there, while the British hospital fleet rescued several thousands of sailors after the great naval engagements in the North Sea. But these vessels are entirely different from the one that the Navy Department is now building. They were originally intended for transports or dispatch boats or even, in some cases, for ocean liners, and, when war came, they were hurriedly refitted for their new mission.

The American hospital ship will differ from all these in that it was planned and designed for a floating hospital from the very beginning, and when it is completed it will constitute the first vessel of its kind in the history of the world, the first hospital ship that was ever built from the keel up.

Naval experts, as a rule, pay very little attention to the question of sea hospitals when they are planning world-power fleets. Even Great Britain, at the beginning of the European war, had less than a dozen of these craft and every one of them was a refitted transport or liner. The United States, with a navy ranking fourth among the sea fighters of the world, has but two hospital ships—one a fairly well equipped vessel now serving with the Atlantic fleet, the other too aged and frail to be removed from its present anchorage in Philippine waters.

Even in time of peace this is far from sufficient hospital space for the needs of the navy. As stated in the last report of Secretary Daniels, "the navy has a big floating population aboard its battleships, composed of men who are continually exposed to the elements and to accidents from machinery, about which many of them work. One hospital ship cannot possibly meet all the requirements of the fleets."

Therefore, as the result of much urging on the part of the Navy Department, congress at last agreed to appropriate $2,500,000 for the construction



New Hospital Ship, Soon to be Added to Our Navy, Which will Have the Distinction of Being the First Vessel Built Especially for This Purpose. Heretofore Hospital Boats have Been Refitted Transports or Liners

of a big first-class hospital ship, to be built at an American navy yard according to plans and specifications laid down by the highest authorities on shipbuilding and hospital construction.

The building of the ship has commenced and it is anticipated that the new craft will be launched late in 1917 or early in the following year. The vessel will be 460 ft. in length and 60 ft. wide, giving her an ordinary capacity of 300 patients, or, in an emergency, 500 may be accommodated. A set of stabilizers, designed to minimize as far as possible the rolling of the ship, will be included in her construction, and it is predicted that the effect of these will be such that major operations can be performed, even in a comparatively high sea.

Another feature of the vessel will be a set of special consulting rooms, for the use of outside, or day, patients, designed like the consulting rooms of a modern land hospital. One of these will be for the use of men suffering from ailments of the ears, eyes, or throat; another room, which will be soundproof, will be used for testing the hearing; a dark room will be provided for the examination of the eyes, while a special suite of rooms will be available for X-ray examinations and treatment. In this suite will be found a dark room for the development of the photographic plates used in connection with this work.

Two of the largest wards will be designed especially for the contagious cases and entrance to these wards will be possible only through a single door, capable of being well guarded. Laundry chutes, leading directly to a sterilizer, will permit the instant fumigation of all bed linen used in the contagious wards. In the diet kitchen the most modern culinary apparatus will be installed, including a device for supplying patients with hot food. This invention resembles a steam table on wheels. The copper-lined vats are filled in the diet kitchen and then carried on an elevator to the ward floor, where the entire apparatus is wheeled from bed to bed, the patients' plates being supplied from the miniature steam table.

Connected with each ward will be several small rooms. There will be a quiet room where very serious cases will be taken; a special room for operations on infected wounds, where everything used must be elaborately sterile; a hydrotherapeutic room and a thermotherapeutic room, in addition to a chain of individual operating rooms to be used for major operations.

The navy's new hospital ship will also contain a dental laboratory, a biological laboratory, and, connected with the latter, an animal yard where monkeys, guinea pigs, etc., will be kept for testing out theories with respect to germ infection. In the stern of the ship, connected with the refrigerating plant, will be the morgue and embalming room, where the bodies of dead officers and seamen may be preserved and brought back to their families at home, instead of being dropped over the side of the ship, as was the former custom.

As compared with this new hospital ship, with its electrical devices, its scientific therapeutic equipment, its vacuum-cleaning apparatus, its elevators, and its modern toilet facilities, the hospital ships which have been refitted for the purpose and are still but makeshifts, appear almost medieval in construction. The United States Navy's floating hospital will not only be the last word in vessels of its class, but it will be a worthy progenitor of specially designed hospital craft which other nations of the world will undoubtedly construct.

BIG UNLOADING CRANE USED IN STORAGE YARD

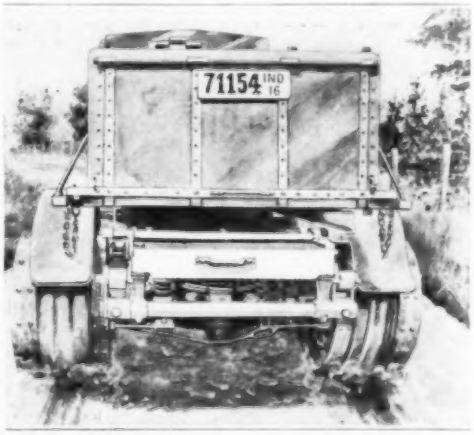
For handling large quantities of coal, stone, sand, and similar materials in its storage yard, a western railway has erected a giant crane that operates along a 1,000-ft. track. As an indication of the size of the great machine, the cantilever truss measures 62½ ft. from its outer edge to the center of rotation. This distance corresponds

This Big Electric Crane is Used in the Storage Yard of a Western Railroad for Handling Large Quantities of Bulk Materials. It Travels along a 1,000-Foot Track and is Controlled by a Single Operator

to the radius of the circle that the crane is capable of describing when in use. The rails on which the machine is mounted are 16 ft. apart and imbedded in heavy concrete. Electric power is employed for operating purposes, and every movement of the machine is under the ready control of one man. The "clamshell" will hold about five tons of sand.

RIM EXTENSIONS ARE HELP TO TRUCK ON BAD ROADS

To prevent heavy motor trucks from becoming mired in soft dirt roads, or stuck in sand, an Indiana inventor has designed an ingenious type of extension rim for application to the rear wheels. The device, for which patent rights have been granted, consists of two steel rims arranged to be bolted to the opposite sides of a wheel. The outer of these is 6 in. in width and the inner one 4 in. Neither touches the ground until the truck sinks the depth of its tires. Then the extensions come into play, giving each rear wheel 10 in. of additional bearing surface and increasing the traction. Thus, on hard roads the steel members form no interference, but are ever ready for an



When Soft Roads are Encountered the Extension Rims Come into Use, Doubling the Bearing Surface of the Rear Wheels

emergency when soft highways are traversed. They can be applied to the wheels of any truck.

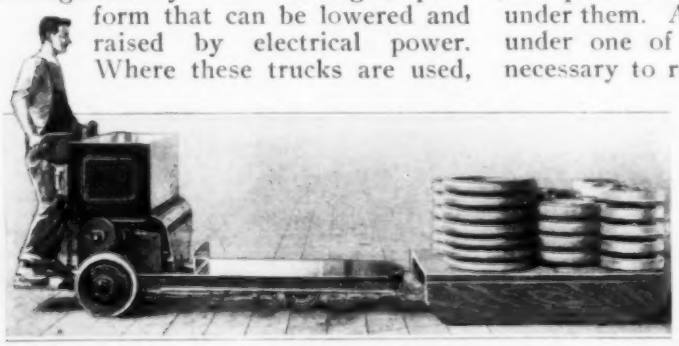
HATRACK AND CHRISTMAS TREE COMBINED

A hatrack has been devised by an Oakland, Calif., inventor, which can serve also as a rack on which umbrellas can be dried and as a Christmas tree. One of the things which prompted this invention was the extensive and wasteful cutting of young evergreen trees for holiday purposes. This rack makes it possible to provide the home with a tree without adding to the depletion of the forests. It consists of a strong central post with a wide-spreading base that can be fastened to a suitable support or to the floor. In the sides of the post are numerous holes in which short pegs can be inserted to support hats, or long pegs to hold umbrellas that are left open to dry. The idea is to remove these pegs at Christmas time and substitute evergreen boughs so cut from trees that they will not injure them. If a little care is taken in selecting boughs of proper size a very realistic tree can be built up with the post as its center. A vase of flowers or an ornament can be fastened to the top of the rack. The base can be made to hold closed umbrellas.

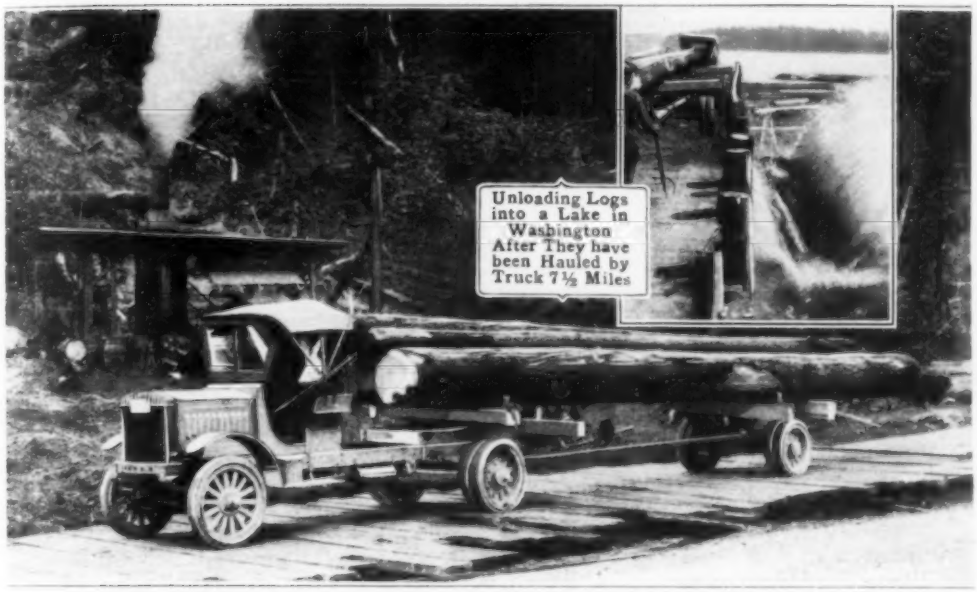
Two Views of a New Hatrack: The One on the Left Shows How Boughs have been Added to Make a Christmas Tree. One Object of the Invention Is to Make Unnecessary the Cutting Down of Young Evergreens

STORAGE-BATTERY TRUCK FOR INDOOR HAULING

One of the modern devices, used in factories, warehouses and the like, to promote efficiency of operation, is a storage-battery truck having a platform that can be lowered and raised by electrical power. Where these trucks are used, material that is to be moved is piled on supports that are raised just high enough above the floor to permit the low portion of the truck to be run under them. After the truck is in place under one of these bases it is only necessary to raise the platform of the vehicle, and the load, with its support, will be lifted off the floor. It requires but seven seconds to raise 4,000 lb. to a height of 3 in. The operator rides, standing, on a small platform next to the batteries, and can guide the truck from room to room at will.



A Storage-Battery Truck, for Use in Factories and Warehouses, with Which Loads on Raised Bases can be Picked Up by Elevating the Truck Platform



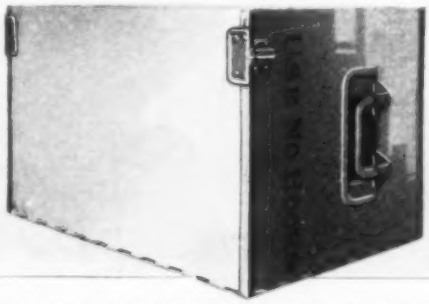
Truck and Trailer with Which a Washington Lumber Company Reaches Forested Regions That would Be Practically Inaccessible if Teams were Used. The Load Weighs Approximately 12 Tons

TRUCKS SUPPLANT TEAMS IN HAULING LOGS

Lumber concerns, in many instances, are now using auto trucks instead of teams to haul their logs out of the forests, particularly where the hauls are long or the roads very difficult. An example of this is found not far from Seattle, where a four-ton truck, with an especially constructed two-wheel trailer, carries loads weighing as high as 12 tons a distance of over seven miles, to a lake where the logs are dumped. The load often is made up of three logs 40 ft. in length and containing a total of from 2,600 to 3,000 ft. of lumber, board measure. In placing these big logs it is planned to put one-third of the weight on the truck and the rest on the trailer, which is heavily built and is connected with the truck in such a manner that the motor is not unduly strained by road shocks. Parts of the road over which these heavy loads are hauled are roughly planked, while much of it is only dirt road, but in spite of these handicaps six round trips of 15 miles are made daily. Another lumber company, which now uses a truck, has to haul its logs only a little over a mile. Formerly four teams did the work of the truck, but a long steep hill was the cause of much trouble with the horses and so the animals were supplanted by a truck, which makes 20 trips a day.

STEEL BOX TO SAFEGUARD FREIGHT SHIPMENTS

For the safe transportation of goods by freight a collapsible box has been introduced which is made entirely of steel. For concerns shipping large



A Collapsible Box, Made Entirely of Steel and Fitted with a Lock, Which is being Used in Preference to Wooden Freight Containers

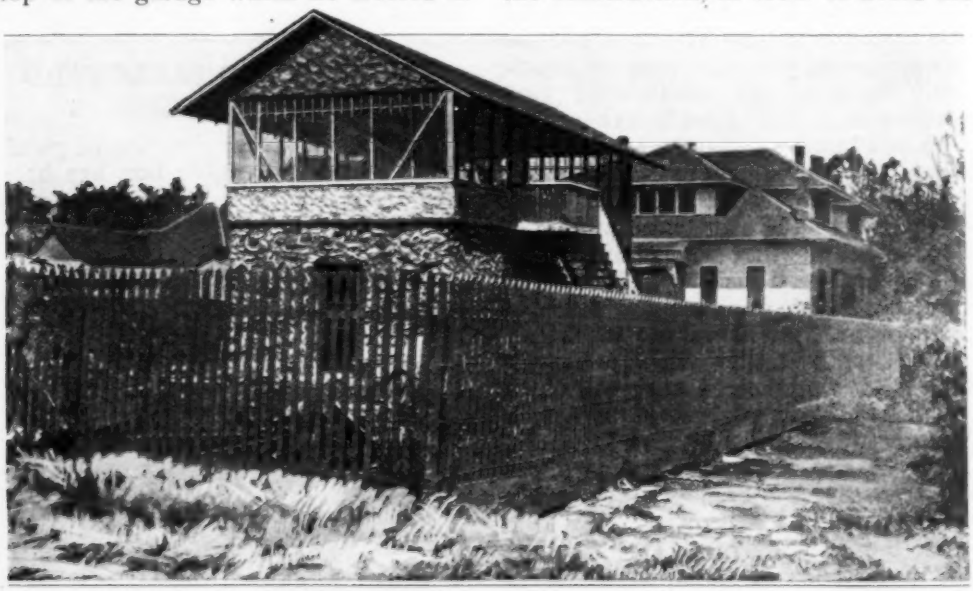
quantities of freight in containers the loss resulting from defective boxes is sufficient to make these steel cases desirable from many points of view. This box consists of six three-ply panels hinged together at their edges and equipped with a strong lock. The edges are extra-strong, being of rectangular tubular construction. It is said that under diagonal stress this box is from 10 to 15 times as strong as a wooden box, and under direct compression, from four to ten times as strong. The lock serves as a binder and, being used in connection with a seal, serves as an ample safeguard against pilfering. These containers weigh from 30 to 60 per cent more than the average wooden box. They will, of course, last much longer. Each is provided with recessed handles which facilitate the work of moving it about.

SCREENED SLEEPING PORCH BUILT OVER GARAGE

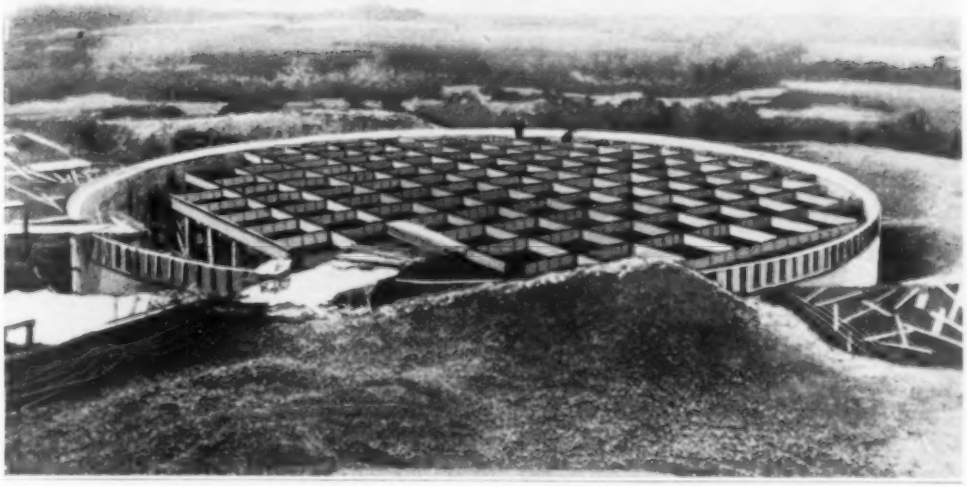
Just as the owners of summer homes at lake and ocean resorts construct screened porches on the tops of their boathouses, so a publisher in Paris, Tex., has placed a screen porch on the top of the garage which he erected in his back yard. In rebuilding the shelter for his automobile after a fire, this man made the structure two stories high. The lower half of the building is of rough stones, while the inexpensive second story, which is reached by an outside stairway, is open on all four sides, and is screened in. The roof with its wide eaves furnishes ample shelter from sun and rain. The porch is used for sleeping purposes.

NORTHERN CITY CONSTRUCTS BIG CONCRETE RESERVOIR

At Hibbing, Minn., a 1,000,000-gal. equalizing and storage reservoir has been constructed as a part of the municipal water-supply system. It consists of a covered, reinforced-concrete tank, 115 ft. in diameter and 14 ft. deep, built in a glacial deposit of sand and gravelly soil. Two layers of 4-in. concrete slabs, between which a thickness of asphaltic waterproofing material is provided, compose the floor. The roof is a 5½-in. reinforced slab upheld by heavy columns with enlarged footings that afford sufficient supporting strength to carry an 18-in. earth cover and deep snow. Throughout the construction, in order to avoid the



A Garage, to Which was Added, at Very Little Expense, a Screened Sleeping Porch, Open on All Four Sides



The Covered Concrete Reservoir at Hibbing, Minnesota, under Construction. The Town's Water Supply is Obtained from a Number of Drilled Wells

joining of new and old concrete, continuous pouring was arranged. The design of the tank takes into consideration the low temperatures prevailing at Hibbing during the wintertime and guards against the freezing of the water when the mercury drops as far as -50° F. in the open. So that sand pumped from the wells may be kept from reaching the 24-in. suction line extending to the high-service pump, a trap has been provided. A glass-covered chamber, and electric lamps set in the concrete, permit ready inspections of the water in both the sand trap and reservoir.

ATTACHMENT EXTRICATES AUTOS FROM MUDHOLES

A simple iron casting has been marketed, which is intended to be used for getting an automobile out of a mudhole instead of nonskidding chains. It is shaped like a "U," and is made in five different designs to fit as many different styles of truck and pleasure-car wheels. The device is fastened to the tire by a chain that passes around the felly. The outer face of the base of the "U" is marked by a heavy ridge which extends transversely with relation to the wheel. As the wheel brings this down into the mud it prevents slipping and so serves to lift the car up out of the mire. It has the same effect in deep sand. Two of these attachments weigh but a few

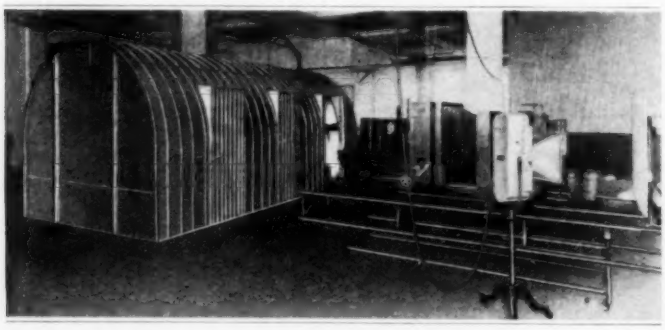
Casting Which When Chained to a Rear Wheel of a Car Enables the Wheel to Obtain Traction Either in Mud or Deep Sand

pounds and will occupy but little space in a tool box. In an emergency they can save much time and inconvenience.

¶ "Your Bosom Friend" is the legend on one firm's laundry wagons in Baltimore.

DEVELOPING ROOMS BUILT LIKE METAL GARAGE

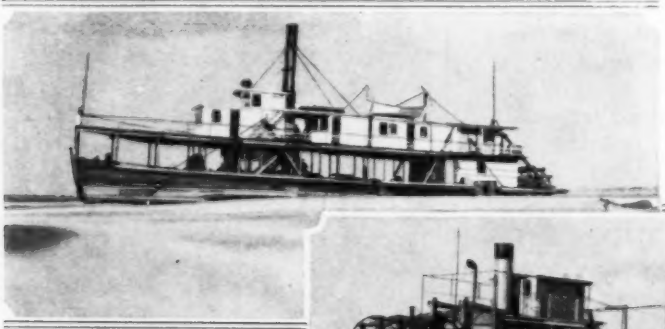
A large engraving company in Kansas City, Mo., has erected three developing rooms on one of its floors, which are made of metal and resemble a portable garage. They have proven much more satisfactory than the wooden compartments commonly constructed to serve the same purpose. The three rooms are contained in one structure, measuring 20 ft. long, 10 ft. wide, and 8 ft. 9 in. high. The roof is rounded and consequently is much easier to keep clean than a flat roof. The structure has the advantage, also, of being fireproof. In case the owners decide to move to new quarters, or to make alterations in their present ones, these developing rooms can be taken apart and moved with little difficulty.



Metal Structure Containing Three Developing Rooms: It is Built Like a Portable Garage, Is Fireproof, and can be Taken Apart Easily

STERN-WHEELERS CAUGHT ON SAND BAR

Fifty years ago at Mosquito Inlet, Florida, a stately lighthouse, 165 ft. high, looked down on a deep-water harbor where 20 vessels often rode at anchor, and a customhouse collected thousands of dollars. Today the lighthouse alone remains, for the conflicting currents of two rivers and the Atlantic Ocean have shifted the sands until now sand bars a mile square are exposed at low tides. One narrow, tortuous channel winds among the bars through which navigation enters and departs. Recently, on a dark night, with a strong northeast wind blowing, two stern-wheelers drifted far over onto the bar. All sorts of plans were resorted to, but only one escaped; the other is a total wreck, rapidly falling to pieces.



This Boat was Successfully Floated Off the Sand Bars and Again Put in Service, but the One Shown Above Remains Stuck and Is Rapidly Falling to Pieces

Church in Carlisle, Pennsylvania, in Which Services are Held Regularly in Spite of the Building of a New Church around the Old Structure

NEW CHURCH BEING BUILT AROUND OLD ONE

Having agreed to erect a new edifice on the site of the church which they now occupy, the members of the Shiloh Baptist church of Carlisle, Pa., decided to build their new church around their old one, because they did not wish to give up the use of the latter until other permanent quarters had been provided. A consideration which doubtless influenced the members in arriving at this decision was that the new church is being built as funds are provided, and the date of completion is necessarily somewhat uncertain. The old building occupies part of the space assigned to the new auditorium. Eventually it will be taken down piece by piece. The new structure will cost $10,000.

¶The first Pan-American aeronautic exposition will be held in New York Feb. 8-15, 1917. The exhibitors will aim to show what American airmen and their associates have accomplished in the past two years for national defense, commerce, and sport.

COMPACT TIRE-REPAIR OUTFIT

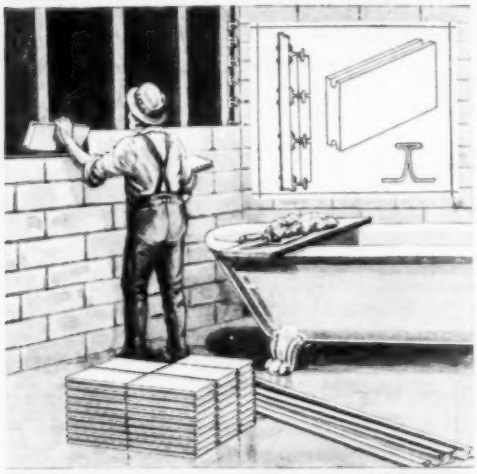
While perhaps the actual number of tires which blow out on the road is less than popularly imagined, nevertheless the automobilist is seldom entirely free from anxiety concerning his tires.

Convenient Repair Outfit Which Contains Practically Everything an Automobilist Needs in Case of Tire Trouble on the Road

Doubtless this accounts for the fact that there has been a large demand for a compact repair outfit which has recently been put on the market. It contains practically everything needed in case of tire trouble, including tube patches, cement, tire tape, protection patches, a pressure gauge, and valve plungers. Each kit is contained in a khaki-colored canvas. The outfit is made in three sizes.

TILE IS APPLIED TO WALLS AND CEILINGS IN NEW WAY

An interior decorator has devised a simple method of applying tile to walls and ceilings without employing a cement binder. It is claimed that the plan overcomes the difficulties commonly encountered in such work and makes the setting of tiles an operation which any intelligent workman ought to be able to accomplish. The chief advantage claimed is that tile can be applied to a ceiling just as satisfactorily as it can to walls, and without greater expense or trouble. The scheme consists of casting longitudinal grooves in the sides of the tiling and attaching "T" or rail-shaped strips of metal in parallel rows to the wall or ceiling surface to be covered. The flanges fit into the slots and hold the members firmly in place. If breakage at any time makes it necessary to replace a tile, the operation can be carried out quickly and without any difficulty, since the metal strips are flexible and project only about halfway into the grooves. It is only necessary that the lower slot be placed over the upper flange of one of the holders, while the upper strip is sprung slightly so that the tile can be straightened and its upper groove alined to receive the other flange. When a wall has been built in this manner, cement is inserted between the edges of the tile to hold them solidly and give the proper finish. Special tile and metal strips are required when curved surfaces are encountered.



By Casting Grooves in Tile and Using T-Shaped Metal Strips as Fasteners, the Objections of a Cement Binder are Obviated

FUR PRICES INTEREST FARMERS IN TRAPPING

Owing to the fact that fur was exceedingly popular for women's apparel last year, and because the demand promises to be even greater this season, many farmers are planning to do a good deal of trapping and thus make a neat sum of money in the winter months. It is the high prices, particularly, that attract the farmers as well as the regular trappers this season, though until now the traps of the former may have lain idle for a long time. There is a demand for a large variety of fur today because it is used in so many more ways than formerly. Not alone are muffs, scarfs, etc., made of fur, but it is used for trimming fancy dresses as well as outer garments, on hats, and even on the tops of shoes.

SHOP BUILDING DESIGNED FOR RESIDENCE STREET

Pleasing architecture is represented in a single-story stucco building at Pasadena which accommodates a number of small shops. It is situated adjacent to a hotel in a residential section of the city, but does not detract from the appearance of the neighborhood. The structure is set back a liberal dis-

When Pains and Taste are Shown, as in This Case, Neighborhood Stores need Not Detract from the Appearance or Desirability of Adjoining Residential Property

tance from the sidewalk and has a double row of white columns extending along the front. These, instead of forming a pergola, serve as high pedestals for flower baskets, and trellises for climbing roses. The parapet of the building is a veritable flower bed with overhanging greenery, shapely box trees, and here and there a spike-leaved palm. A cement walk that borders the front of the building has open spaces for shrubbery, while at regular intervals there are permanent paths connecting with the main walk and extending beyond it to the curb. This arrangement leaves a dozen or more small plots of ground which have been converted into so many flower gardens and refreshing patches of sod, which are shaded part of the day by a long row of fern-leaved pepper trees flanking the outer edge of the sidewalk.

Detroit policemen are to be supplied with pamphlets which minutely describe each part of a motor car, so that they can more readily detect any interchange of parts which automobile thieves may make in trying to conceal their thefts.

THIRTY-ONE ARMY TRUCKS MAKE LONG, FAST TRIP

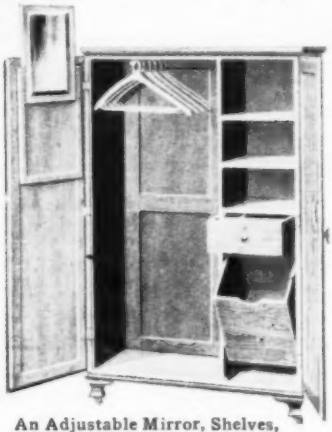
A quite remarkable record was made recently by a train composed of 31 three-ton motor trucks belonging to the United States Army, which went from Columbus, N. M., to San Antonio, Tex., a distance of over 800 miles in 13 days, actual running time. The trucks carried their own water, gasoline, etc., and supplies for the men. A greater part of the route was across the untrailed desert. In many places road had to be built with the aid of the firewood that was taken along. Gumbo, freshly moistened by floods, added greatly to the difficulties, and yet the procession made a daily average of 66 miles. The shortest run for a day was three miles when much road had to be built, and the longest run was 126 miles. The machines were in such good condition that on arriving at their journey's end they were used for other work at once. According to army regulations it would have taken four-mule teams about 47 days to make this trip, their rate of travel being reckoned at 17 miles per day.

NEW ARTICLES OF HOUSEHOLD FURNITURE

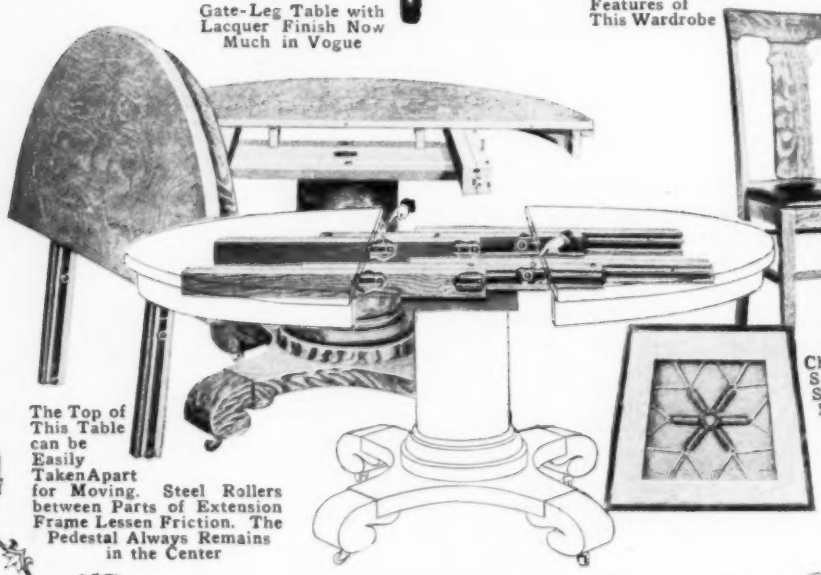
Colonial Tea Wagon with Removable Tray and Drop Leaves That Add Much to Its Utility

Chaise Longue Which, When Tilted Back, Reveals Spacious Clothes Chest in Its Base

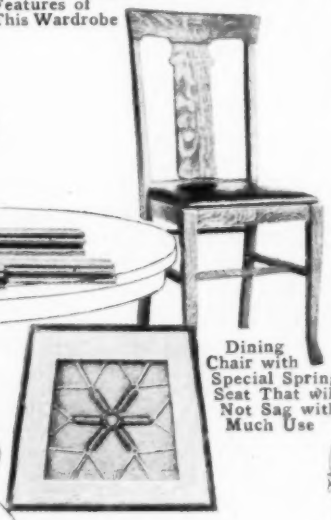
Gate-Leg Table with Lacquer Finish Now Much in Vogue



An Adjustable Mirror, Shelves, and Tilting Drawers Are Features of This Wardrobe



The Top of This Table can be Easily Taken Apart for Moving. Steel Rollers between Parts of Extension Frame Lessen Friction. The Pedestal Always Remains in the Center



Dining Chair with Special Spring Seat That will Not Sag with Much Use

DESIGNED FOR BOTH UTILITY AND BEAUTY

A Hall Chest Which Is a Pleasing Example of the Lacquered and Ornately Decorated Furniture Which is Becoming Very Popular

Portable Rack with Which a Selection of Books and Magazines can be Easily Moved to Any Part of the House. Note Convenient Drawer in the Base

Artistic Triangular Writing Desk That will Just Fit into a Corner. It Has a Surprising Amount of Room

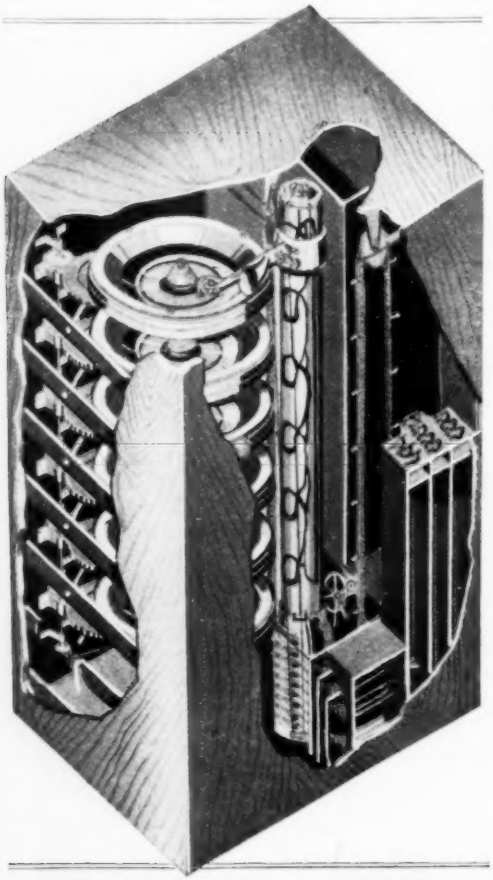
A New Type of Tall Clock That Occupies Little Space

Phonograph Combined with Grandfather Clock in Which Is Ample Room for Records. Behind the Clockwork Is a Compartment Also

Library Table That can be Converted into a Writing Desk, as Shown at Right, by Raising Up Concealed Pigeonholes at the Back. Weights Aid in Lifting Concealed Parts

PHONOGRAPH RECORDS ARE PLAYED AUTOMATICALLY

Application for patent rights has been made by an eastern inventor who has designed a phonograph that is capable of playing several disk records



By Means of a Mechanical Arrangement Which Causes the Sound Box to be Carried from One Record to Another, a Program of a Half Dozen or So Records can be Played Automatically

in succession without requiring the attention of an operator. The machine also will select special records and render them, or reproduce a single one as many times as is desired. Another feature of the apparatus is that records of different sizes with starting and ending grooves of various diameters, can be employed. The instrument is provided with a series of turntables, arranged one above another, on which the records are held. Adjacent to these, at one side, is a vertical column on which a movable arm carrying a sound box is mounted. After the lowest record in the series has been played, the traveling arm raises the sound box to the uppermost position and sets the needle in the first groove of the top record. Small regulating knobs permit an operator to omit, repeat, or stop the rendition of any particular selection. Furthermore, it is possible to set the machine to stop automatically after playing any record. The cabinet occupies a floor space a trifle more than three feet square, while its height depends upon its capacity. A machine holding six records would be approximately five feet in height.

CLEVELAND FAMOUS CENTER OF BANKING BY MAIL

The city of Cleveland, Ohio, has the distinction—not alone in the United States but in many foreign lands as well—of being known as the "home of banking by mail." Statistics show that Cleveland's population is one-half of one per cent of that of the whole country, and yet that city holds in savings more than six per cent of the country's savings-bank deposits. In the proportion of this fund to the number of its people, Cleveland far surpasses any other American or foreign community. One of the institutions in that city which has made a specialty of this sort of banking has assets amounting to over $50,000,000. Probably the most important factors in its success have been that it pays four per cent, and that its terms are liberal in the matter of allowing interest on short-time deposits. Another element contributing to the large growth of its mail business has been publicity, which has secured the patronage of ranchmen on the plains, missionaries in China, workingmen in London, and many sailors in the navy. It is said that there has not been a single instance of loss in sending money through the mail to this unique banking center.

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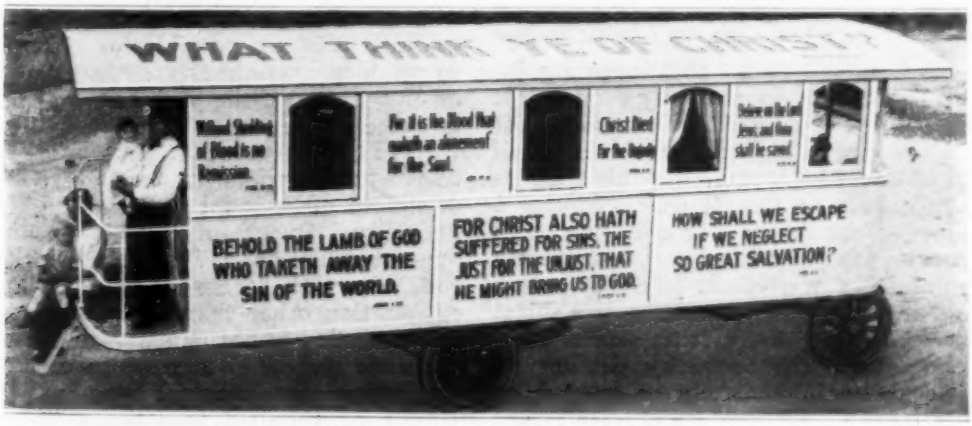
MEXICANS REBUILD "GRINGO" ARMY BRIDGE

WHILE American troopers from the expeditionary camp at El Valle looked on, Mexicans recently tried to reconstruct a frame bridge across the Santa Maria River. The first structure was erected by United States Army engineers and subsequently swept away by high water.

EVANGELIST AND FAMILY TOUR IN GOSPEL TRUCK

A Pacific coast evangelist is touring the country with his family in a two-and-one-half ton motor truck, which he has fitted up as his home. The vehicle attracts much attention because on its light-colored body are painted numerous quotations from the Scriptures. At the rear of the car is an observation platform, from which steps lead down to the ground. It can be utilized as an outdoor pulpit. A door leads from the platform into a room having window seats on either side, which serves as a living room. The remaining space is occupied by disappearing beds, a small kitchen, a cupboard that serves as a pantry, and a

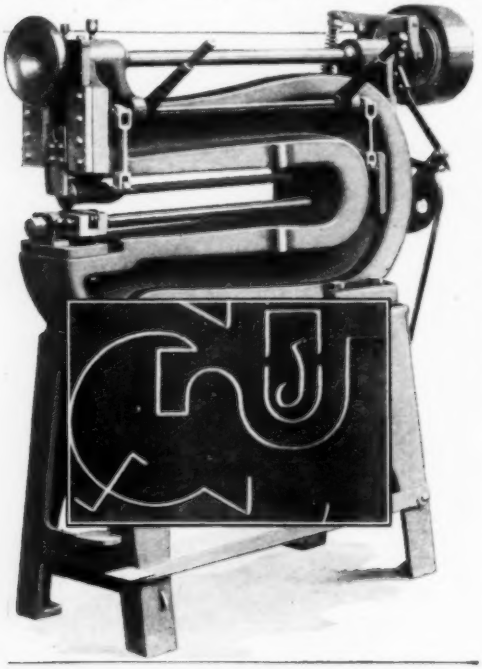


A Two-and-One-Half Ton Motor Truck Fitted Up as a Home, in Which an Evangelist and His Family are Touring the Country

bookcase containing the evangelist's library. All told, there are sleeping accommodations for four. The driver's seat is shut off from the rest of the car.

DEVICE CUTS SHEET-METAL MATERIAL IN ANY SHAPE

A new type of sheet-metal cutter has been brought out recently by a Knoxville, Tenn., manufacturer, with



Sheet-Metal Cutter Which Is Not a Rotary Shear, but Cuts Material at a Rapid Rate. Material is Fed into It as One Feeds Cloth into a Sewing Machine

which metal, up to and including 3/16 in. thick, can be cut in any conceivable shape at the rate of 30 in. a minute, or faster, according to the thickness of the material. Metal is fed into the machine just as one feeds cloth into a sewing machine. The cutter does away with much handwork and greatly diminishes waste. It is not a rotary shear, but cuts by means of a vertical reciprocating knife that continually chips away the metal by passing up and down immediately in front of a stationary horizontal knife. An upper feed roller, under spring compression, and two lower feed rollers hold the stock rigidly in position and advance it by their intermittent feeding. The machine produces a clean-cut kerf and eliminates all springing and buckling. The feed control is independent of the cutting device and is obtained both from the front and rear so that material of any length can be cut. The depth of the throat of the cutter is 34 inches.

GAS ENGINES LOSE POWER IN HOT COUNTRIES

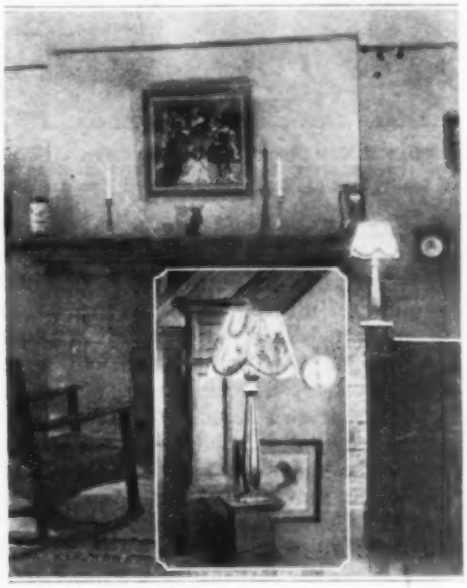
Some of the eccentricities of internal-combustion engines are strikingly peculiar and little understood. English manufacturers have received many complaints from foreign purchasers in warm climates regarding the failure of motors to develop their rated horsepowers. This has led to considerable misunderstanding and in certain cases ill-feeling, for in numerous instances it appears that the makers have overlooked as completely as have the owners the real source of trouble.

English motors that deliver their rated power at home will not do so when tested in a climate such as is encountered in India. This is not because of any fault of the engine, but on account of the difference in atmospheric conditions. Nearly every owner knows that a loss of power is to be expected in high altitudes, but it is not so generally realized that a like condition will obtain in hot climates. It is claimed that in India it is not possible for a motor to produce continuously more than 80 or 85 per cent of the power at which it is rated in Europe. This loss also varies in different localities having corresponding temperatures and altitudes, doubtless on account of variations in humidity. In commenting upon the general situation a British authority concludes that "there seems to be no explanation other than that the air is more rarefied in hot climates, and that the same weight of mixture in correct proportion for efficient combustion cannot be received into the cylinder at each revolution."

SIMPLE WAYS OF IMPROVING INTERIOR ILLUMINATION

Owing to the lack of proper lighting, it is not unusual that certain objects in a room, such as paintings and statues, largely lose their decorative value at night. With a little study, conditions of this sort may often be overcome easily without necessitating the installation of additional fixtures or wiring. Two interesting examples of how this was accomplished in one home are cited by an expert on illumination. In one instance a painting, in which deep reds and browns predominated, hung above a mantel and required much stronger lighting than it normally received. The condition was remedied by cutting an opening in the cretonne shade of a small lamp, used on a newel post in front of the fireside seat, so that a shaft of light fell across the picture and the surrounding wall. This did not injure the appearance of the shade or lessen the usefulness of the lamp. The other problem was that of illuminating a statue which stood on a pedestal in one corner of a room where it received but little light. A small mirror was fastened at an angle to one of the chains holding a suspended bowl fixture, be-

A Small Mirror was Attached to One of the Chains of the Chandelier so That a Shaft of Light was Thrown upon the Statue. The Contrasting Pictures Indicate the Result of the Simple Expedient



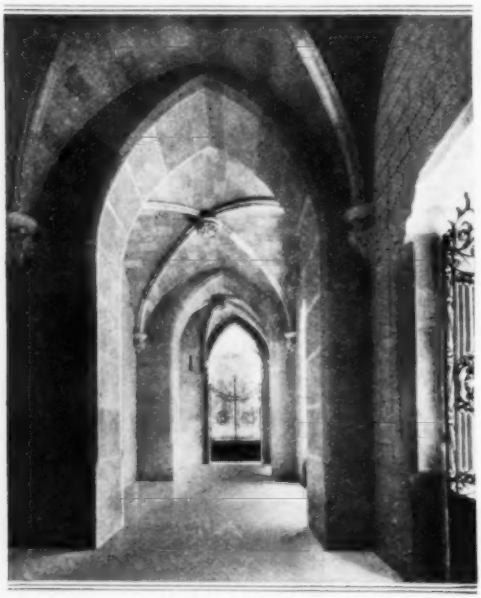
PHOTOS BY COURTESY OF THE LIGHTING JOURNAL

To Properly Light the Painting above This Mantel, a Small Opening was Cut in the Top of the Cretonne Shade Covering the Lamp on the Newel Post. The Insert at the Right Shows How This was Done

ing so arranged that it threw a strong beam of light on the piece of statuary. By exercising some ingenuity, illumination problems of similar nature can often be as readily solved as were these.

MARBLE AND STONE EFFECTS GAINED WITH CEMENT

According to a correspondent who has just returned from Cuba, some of the insular towns hold many examples



Narthex of New Church Building in Cuba, the Walls of Which Appear to be Erected of Red Sandstone, but in Reality Are of Skillfully Executed Cement Work

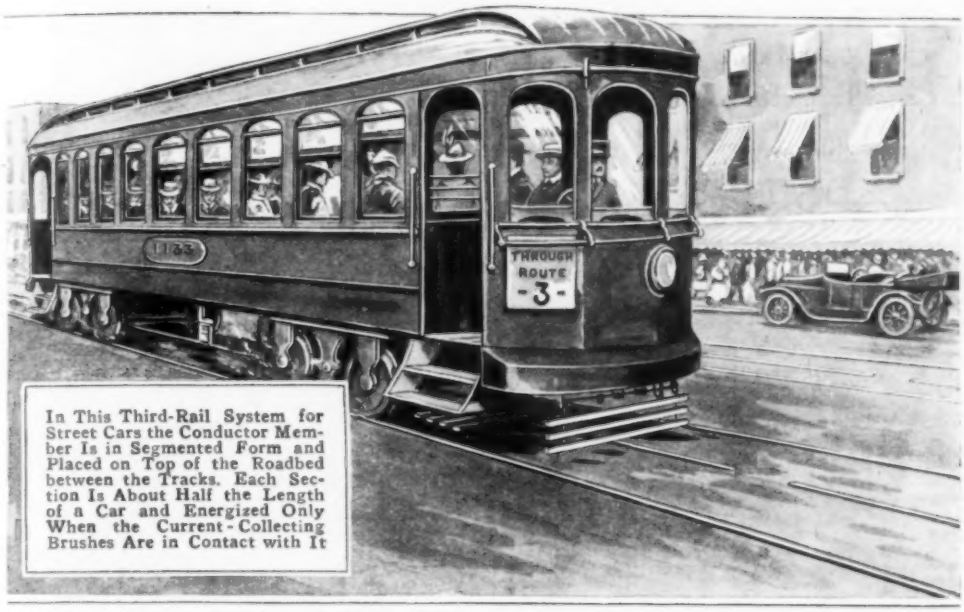
of unusual cement work. At Camaguey, one of the country's oldest communities, a number of splendid residence buildings are in the course of erection. In nearly every instance, he reports, the outer walls of these structures are of cement construction, but except on close scrutiny have nearly every appearance of being rough-dressed stone, or chiseled marble. The reason for this seems to be that the Cubans have discovered ways of obtaining remarkable effects by artificial means. A beautiful church edifice recently completed at the town is cited as an example of this. Both the inside and exterior walls, it is said, have the appearances of being built of red sandstone. The process seems to consist of applying a cement "veneer" to the rough facing and then with the aid of certain instruments giving it the semblance of having been hand-tooled. The pointing produces the effect of blocks of irregular sizes. Casual observation, the correspondent states, would not disclose the true character of the material.

HEIGHT OF LUXURY IN NEW FOURTEEN-ROOM FLATS

Apartments, which will be among the most modern and luxurious to be found anywhere and which will possess a number of unusual provisions, are to be erected soon by a Chicago woman, according to a recent announcement. The building will be six stories high and the first floor will be given over to an entrance hall, a large entertainment room, a janitor's flat, chauffeurs' quarters, kitchens, serving rooms, etc. The apartments proper will occupy the next four floors and will have 14 rooms and four baths each. The sixth floor will have facilities which each of the tenants below can share in using, such as a roof garden, outdoor sleeping quarters, and guest chambers.

STEREOPTICON SLIDES MADE OF MICA

Stereopticon slides are now being made of mica, instead of glass, and are surrounded with heavy cardboard frames to give them suitable thickness at the edges. While it does not seem possible to produce such delicate shading on mica as on glass slides, nevertheless there are many practical uses for the new slides and in certain respects they are preferable to the glass. They are so light that two can be sent as first-class mail matter for two cents. They will not break when roughly handled and they can withstand heat indefinitely, whereas glass slides are often cracked by projecting lanterns.



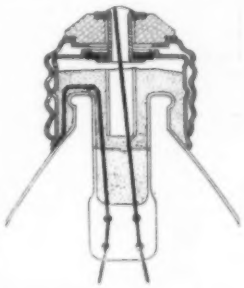
In This Third-Rail System for Street Cars the Conductor Member Is in Segmented Form and Placed on Top of the Roadbed between the Tracks. Each Section Is About Half the Length of a Car and Energized Only When the Current-Collecting Brushes Are in Contact with It

SECTIONAL CONDUCTOR RAIL FOR STREET-CAR SYSTEM

To obviate the disadvantage of the overhead trolley, a California inventor has developed a third-rail system for surface-traction lines. The plan differs from others in that the conductor rail, which is placed on top of the roadbed between the tracks, is segmented. Each section is slightly less than one-half the length of a car and is insulated from the abutting ends of adjacent members. One of these lengths is energized only while the current-collecting brushes are in contact with it, so that except for an instant when a car is passing, it carries no load and is harmless. The current is cut in and the circuit subsequently broken, magnetically. Except for the very short time when the brushes span two segments of the conductor rail, only one section is alive. The instant that a brush passes off one of the lengths, the latter becomes deënergized and does not put pedestrians and others in jeopardy, according to the claims of the inventor, who says the system can be applied to existing overhead-trolley lines for about $10,000 a mile. Simple installations are made on the cars.

ELECTRIC-LIGHT BULB IS THIEF-PROOF

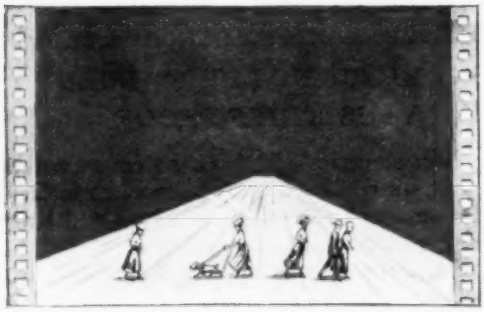
An electric-light bulb so constructed that its removal from its socket makes it permanently useless is now being introduced in hotels, depots, and other public places where there is a temptation to pilfer bulbs. The base of this bulb, which automatically locks into the socket, consists of two parts, an outer rotating shell and an inner shell cemented to the lamp. The bulb can be screwed into any ordinary socket but cannot be removed by turning it in the opposite direction. When it is necessary to replace the bulb it should be given a slight downward pull; this breaks the leading-in wire connecting the center contact with the filament. In its lowered position the outer shell of the lamp base engages a reverse ratchet and the lamp can then be unscrewed. The connection being broken the lamp cannot be used again.



STILL PICTURE IS SETTING FOR ACTION IN MOVIE

Considerable interest is attached to a recent invention in the moving-picture field which permits a still

The Street Space is Left Blank, but the Remainder of the Slide, When Projected upon the Screen, Provides a Still Setting for Whatever Action is to be Portrayed



Foreground and Action Appear in the Film, Which is Projected and Carefully Registered so as to Fill Exactly the White Space Left by the Transparent Part of the Slide

The Slide and Film as They Appear When Shown Simultaneously. The Arrangement Permits a Foreign or Other Setting to be Used with a Studio Production at Minimum Cost

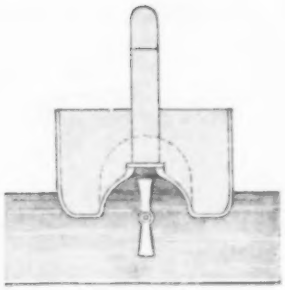
photograph to be used as the setting for a scene in which action takes place. This is accomplished by the combined use of a slide and film, the former carrying the image of the general background and the latter presenting the animated part of the picture. Several advantages are claimed for the system, one being that natural coloring can be obtained by merely tinting a single slide for each scene. This would cost practically nothing and eliminate the heavy expense now encountered in such work. Another feature is that a South Sea, Arctic, or any other kind of a foreign picture can be produced in a studio with the aid of a few still photographs, thus saving the cost of transporting a company to some far-away point for the sake of obtaining natural scenery. A certain space in the slide is left blank. Motion pictures are taken of the action and the two projected simultaneously. In short, the idea is very similar to one commonly used in animated cartoons, although the method of execution is quite different.

ICELANDIC TRADING SHIP DOCKS AT NEW YORK

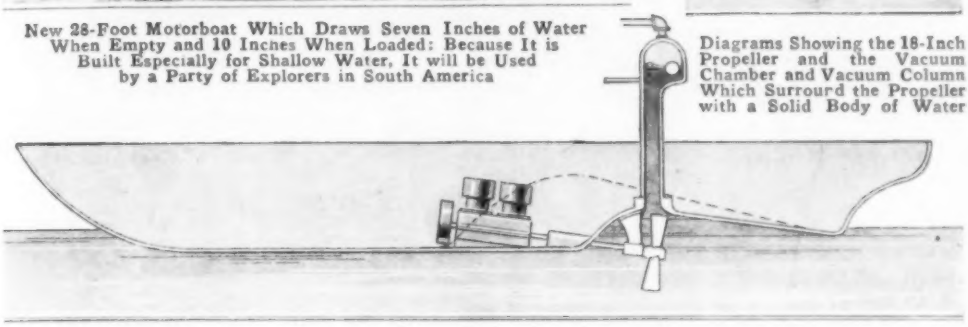
Loaded with a cargo of herring and carrying some 28 passengers from Reykjavik, the "Gullfoss," an 886-ton steamer, put in at New York late in September. The arrival of the little vessel attracted considerable attention among veteran seamen, wharf hands, and ship reporters alike, for it is one of the first Icelandic ships to enter a harbor in the western hemisphere since the historical voyages of Leif Ericsson, the son of Leif the Red, about the year 1,000, and others of the Vikings of that period. The captain of the steamer declared that remarkable prosperity has been felt in Iceland, for the past two years, on account of the war. Most of the passengers of the vessel were merchants of Reykjavik, the capital, who came to New York to purchase American goods.

¶It has been proposed that a special shape peculiar to tablets containing poison be adopted, thereby lessening the danger of their being swallowed by mistake.

New 28-Foot Motorboat Which Draws Seven Inches of Water When Empty and 10 Inches When Loaded: Because It is Built Especially for Shallow Water, It will be Used by a Party of Explorers in South America



Diagrams Showing the 18-Inch Propeller and the Vacuum Chamber and Vacuum Column Which Surround the Propeller with a Solid Body of Water

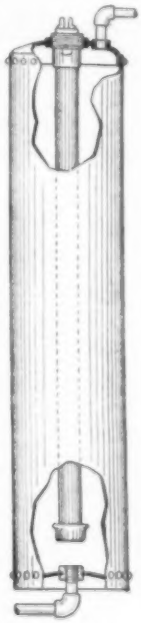


NEW SHALLOW-WATER BOAT FOR EXPLORERS

A party which plans an exploring expedition in certain South American rivers has purchased a shallow-water motorboat for which a resident of New York has recently secured patents. The craft is 28 ft. long, has an 8-ft. beam, and is equipped with an 18-in. propeller. The latter projects less than 10 in. below the lowest point of the keel, is situated in a well or tunnel, and operates at all times in a solid body of water, because a vacuum column, which extends upward from the tunnel, draws the water up into the latter and the column to a depth of at least 4 ft. 9 in. The boat has a draft of but 7 in., without a load, and when carrying 15 passengers draws approximately 10 in. of water. The motion of the propeller tends to lift the boat from the water. The boat is so shaped that it produces practically no stern waves. The purchasers believe that it will prove particularly adapted to exploring shallow streams and inlets. It is large enough to carry a good-sized party, together with their camp equipment and all needful supplies for a considerable period.

ELECTRIC WATER HEATER BUILT ON NEW LINES

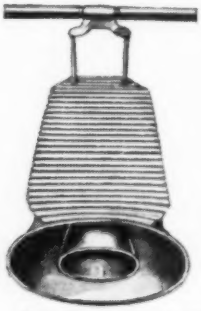
A new electric water heater is so designed that it can be easily inserted in any ordinary hot-water tank; it operates continuously, using a comparatively small but steady current, and it is claimed to be less expensive to operate than many instantaneous heaters, particularly in cases where the power company will grant a special low rate in view of the fact that it uses current constantly instead of making large sudden demands when the rest of the load may be heavy. The heater consists of a tube, 56½ in. long and 1½ in. in diameter, filled with an insulating, nonoxidizing fluid in which the heating element is inserted. After being connected with the electric current it needs no further attention and will supply 45 gallons of water at a temperature of 115° every 24 hours.



SOME NOVEL AND LITTLE-KNOWN ACCESSORIES

Moisture-Proof Salt and Pepper Cellars Made of Satin-Finished Aluminum and Costing 50 Cents a Set. Instead of Shaking Them, a Button is Pressed

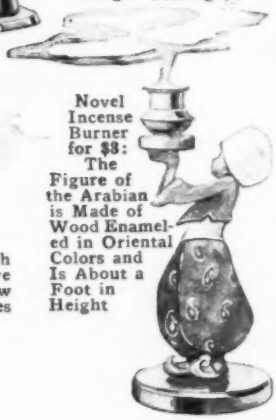
Indestructible Cork, Screw, and Bottle Opener in One, Priced at 50 Cents. Always Convenient for the Buffet or Kitchen



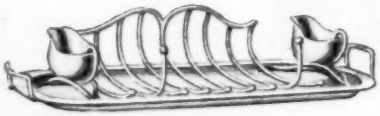
Vacuum Washer with Corrugated Rubbing Board Attached, Suitable for Use When Cleaning Articles Not Intrusted to Laundry. It is Made in Two Sizes, the Larger Costing $2

Wooden Grip That may be Applied Quickly to the Handle of Any Kettle or Similar Utensil. It Costs But 10 Cents and Saves Trouble and Burns

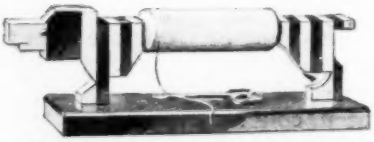
Compact Kitchen Range with High Oven: It Holds Fire Overnight and Heats in a Few Minutes. The Cost Varies from $35 to About $46, According to Finish



Novel Incense Burner for $3: The Figure of the Arabian is Made of Wood Enameled in Oriental Colors and Is About a Foot in Height



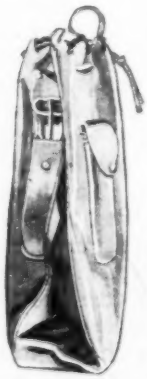
Attractive Serving Dish for Asparagus with Two Artistic Receptacles for Dressings. It Is Available in London for $12.50



Fantastic Dachshund Made of Wood and Decorated with Black and White Stripes: It Serves as a Twine Holder, and with Scissors Costs $3.50

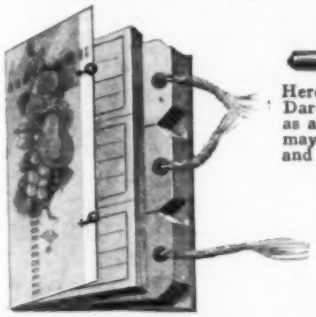
Quaint Egg Service, Gayly Decorated, Provided with Salt and Pepper Shakers the Size and Shape of Bird Eggs. With a Red and White Rooster Cozy the Cost Is $1.50

So many Popular Mechanics Magazine readers have suggested that the quoting of prices would increase their interest in the useful devices described in these two pages that hereafter the cost, or approximate cost, whenever ascertainable, will be stated. Most of these utilities are on the market and the addresses of dealers may be procured from our Bureau of Information.
—Editor.



This Tan-Leather Shoe Bag is Fitted with Small Pockets in Which Extra Trees may be Carried. The Price Is $3 for Various Sizes

INTENDED FOR THE HOME AND ITS MEMBERS



This Cretonne-Covered Portfolio Containing Shipping Tags and Labels for Use during Christmas Season When Gifts are being Dispatched, Is Available for $1.50

Here Is a Hosiery Darner That Serves as a Needle Case and may Also be Employed When Gloves and Mittens are Mended. It is Priced at 20 Cents

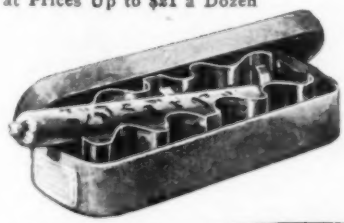
This Odd Chinese Plant Remains Fresh Indefinitely, Giving a Pleasing Touch of Green to a Room. The Earthen Receptacle Is About Eight Inches High and Costs 75 Cents. Plant Stalks Range to 40 Cents Each

Movable Support for Heavy Plants in Pots and Tubs, Available in Sizes Ranging from 12 to 22 Inches in Outside Diameter, at Prices Up to $21 a Dozen

At $3.50, a Durable, Conveniently Arranged Apron Made of Tan Duck for the Girl Who Takes Care of Her Motor Car

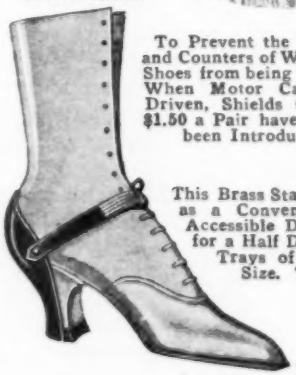
Effective 15-Cent Mousetrap That can be Baited and Set without Danger of Injuring the Fingers

Neat Wire Receptacle for Dentifrice and Brushes, a Convenient Fixture for the Toilet Room. It may be Applied to a Wall or Fixed Inside a Medicine Cabinet. The Price Is 10 Cents



Inexpensive Foot Warmer for Car: Felt-Covered Metal Box in Which Charcoal Sticks are Burned. It Costs But 60 Cents

This Hairbrush, Costing $1.25, is Supplied with Long, Stiff Whalebone Bristles That Wear for Years and Improve the Condition of Scalp



To Prevent the Heels and Counters of Women's Shoes from being Scuffed When Motor Cars are Driven, Shields Costing $1.50 a Pair have Lately been Introduced

This Brass Stand Serves as a Convenient and Accessible Depository for a Half Dozen Ash Trays of Uniform Size. The Price Is $5

Warm Foot Muff, Lined with Camel's-Hair Velour and Supplied with Heavy Felt Sole, is Priced at $15

A SIMPLE CALENDAR FOR FIFTY CENTURIES

There has been compiled recently a simple calendar, or set of tables, with the aid of which even a child can quickly ascertain the day of the week on which a date falls. The tables can be used for any date within the range of the 50 centuries ending Dec. 31, 5,000 A. D. There are five tables in all, indicated as "centuries," "years," "months," "days," and "key," respectively, as shown herewith. The use of the tables can best be shown by example. Lincoln was assassinated April 14, 1865. To ascertain on what day of the week this fell, one adds together the following key numbers: For 18, which is the number of the century in this date, the key number shown in the "centuries" table is 2. For 65, the year in that century, the key number in the "years" table is 4. For April the key number is 0 and for 14 the key number in the "days" table is 7. The total of these is 13. By looking in the last, or "key," table it appears that 13 is the number for Friday, which is the day on which the tragedy occurred. For certain dates which fall in leap years, the procedure is varied slightly. This also is true for dates falling in the latter half of the eighteenth century, because 10 days were dropped from the calendar in that century.

CENTURIES

0 4	5 6	10 1	15 3	20*6	25 4	30 2	35 0	40*6	45 4
1 3	6 5	11 0	16 2	21 4	26 2	31 0	36*6	41 4	46 2
2 2	7 4	12 6	17 1-4	22 2	27 0	32*6	37 4	42 2	47 0
3 1	8 3	13 5	18 2	23 0	28*6	33 4	38 2	43 0	48*6
4 0	9 2	14 4	19 0	24*6	29 4	34 2	39 0	44*6	49 4

YEARS

00*0	10 5	20*4	30 2	40*1	50 6	60*5	70 3	80*2	90 0
01 1	11 6	21 5	31 3	41 2	51 0	61 6	71 4	81 3	91 1
02 2	12*1	22 6	32*5	42 3	52*2	62 0	72*6	82 4	92*3
03 3	13 2	23 0	33 6	43 4	53 3	63 1	73 0	83 5	93*4
04*5	14 3	24*2	34 0	44*6	54 4	64*3	74 1	84*0	94 5
05 6	15 4	25 3	35 1	45 0	55 5	65 4	75 2	85 1	95 6
06 0	16*6	26 4	36*3	46 1	56*0	66 5	76*4	86 2	96*1
07 1	17 0	27 5	37 4	47 2	57 1	67 6	77 5	87 3	97 2
08*3	18 1	28*0	38 5	48*4	58 2	68*1	78 6	88*5	98 3
09 4	19 2	29 1	39 6	49 5	59 3	69 2	79 0	89 6	99 4

MONTHS

Jan.	Feb.	Mar.	Apr.	May	Jun.
1(0)	4(3)	4	0	2	5
Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
0	3	6	1	4	6

DAYS

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	

KEY

Sun.	Mon	Tues.	Wed.	Thu.	Fri	Sat.
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

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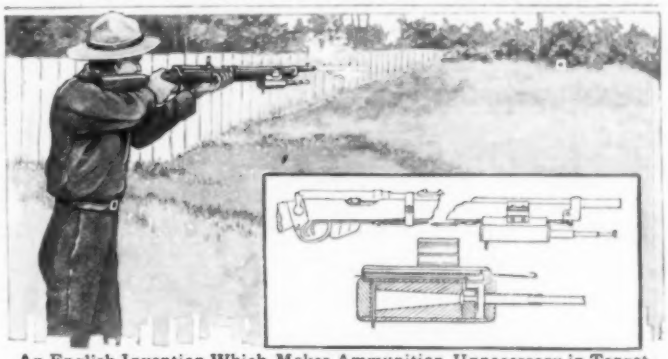
A Calendar Covering 50 Centuries, with the Aid of Which One can Quickly Ascertain on What Day of the Week Any Date Falls

FISH MEAL GOOD FOR HENS AND STOCK, TESTS SHOW

Contrary to popular belief, fish scrap makes an excellent food for stock and poultry. While some stock and poultry raisers have long recognized this fact, the majority in this country have been prejudiced against such feedstuffs because of the belief that it would impart undesirable flavor to meat, milk, or eggs. The bureaus of Chemistry and Animal Industry have recently completed a wide investigation of this question and they find that, while in some cases fish meal, if fed heavily, might give flavor to meat of poultry, for example, by withdrawing the meal a short time before killing all unpleasant flavor will be eliminated. In Germany and in England fish meal has long been recognized as a valuable supplementary food for animals. Careful estimates show that nearly 120,000 tons of this food, high in protein value, can be produced annually from the wastes of the salmon and sardine-packing industries, and of the menhaden fish-oil and fish-scrap factories on the coasts. The bureaus referred to recently fed a ton of this fish meal, made from sardine waste, to dairy cattle, growing pigs, and poultry, and in each case found no detrimental effect, but rather proved that it was a most satisfactory feed. Fish waste used for this purpose should have the oil removed by pressure, and should then be steamed while it is still fresh. A considerable quantity of waste is now used for fertilizer.

GUN PHOTOGRAPHS TARGET INSTEAD OF SHOOTING

Target practice with firearms, even in places where many persons may be within the range of the guns, is rendered entirely safe by the patent of an English inventor, which makes ammunition unnecessary. The invention can be attached to a rifle, for example, without altering the latter. It consists chiefly of a small cylindrical camera which fastens to the under side of the barrel and is fitted with a telescopic focusing device, so positioned that its line of focus is parallel to the gun barrel. Immediately in front of the trigger of the weapon a second trigger is placed, which is connected with the camera shutter by a wire. When a marksman has aimed his gun and pulls the triggers, the camera trigger is operated just an instant before the gun trigger and consequently a snap shot is secured of the target that the gun was pointed at. The position of the target as it appears on the developed plate or film will indicate the accuracy of the shot. If the bull's-eye is exactly in the center it shows that the gun was correctly aimed. Compact developing apparatus can be attached to the camera if desired. By using blank cartridges with this device all the sensations of real shooting are secured.



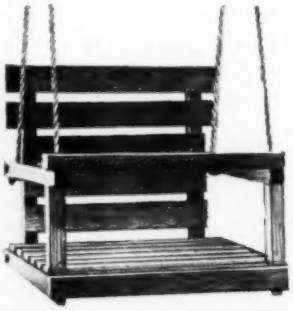
An English Invention Which Makes Ammunition Unnecessary in Target Practice: The Tiny Telescopic Camera Attached beneath the Gun Barrel Takes a Snap Shot of the Target an Instant before the Trigger is Pulled

FIBER LEGGING HAS NEW KIND OF FASTENER

A legging, or puttee, for hunters, soldiers, etc., has been devised which is distinctive in that it is made of light, waterproof fiber, more durable than leather, and is equipped with a new type of fasteners that enable one to adjust the legging readily. This new puttee opens at the side and its two edges overlap slightly. At three suitable points in the underlying edge narrow slots are cut, on either side of which are fastened little corrugated or serrated strips of metal. On the under side of the outer edge, opposite these slots, T-shaped spring keepers are attached. In putting on a legging one inserts the keepers in the corresponding slots, so that the cross arms which are serrated on one side, will engage the corrugations on either side of the slots. In this way the article can be fitted about the limb as snugly as desired. To unlock the legging it is only necessary to press the releasing button that is a part of each fastener.

The Leggings of This Soldier's Uniform Are of Waterproof Fiber, Equipped with Easily Adjusted Metal Fasteners, the Parts of Which are Shown in the Diagrams

TWO PAGES OF INTERESTING IDEAS

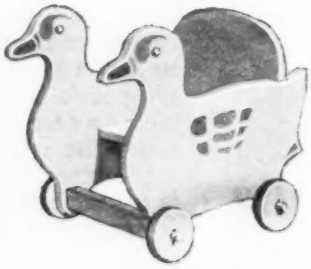


Folding Swing Like Those Built for Grown Folks except That It Is Smaller, Being 14 Inches Wide and 12 Inches Deep

A Rail Fence, Made in Sections, with Which a Child can Play Farm and Lay Out Fields on the Carpet or Lawn. A Dollar will Buy Seven Feet of Fence Packed in a Neat Box

Left: A Little Washing Machine Just Suited to Washing the Dolls' Clothes and Bedding: It Costs $1.50 and Works Like a Big Washer

A Child's Chair with One Big Broad Arm Which can Serve as a Table for the Luncheon, Playthings, or Picture Books. They Cost $1.75 Each



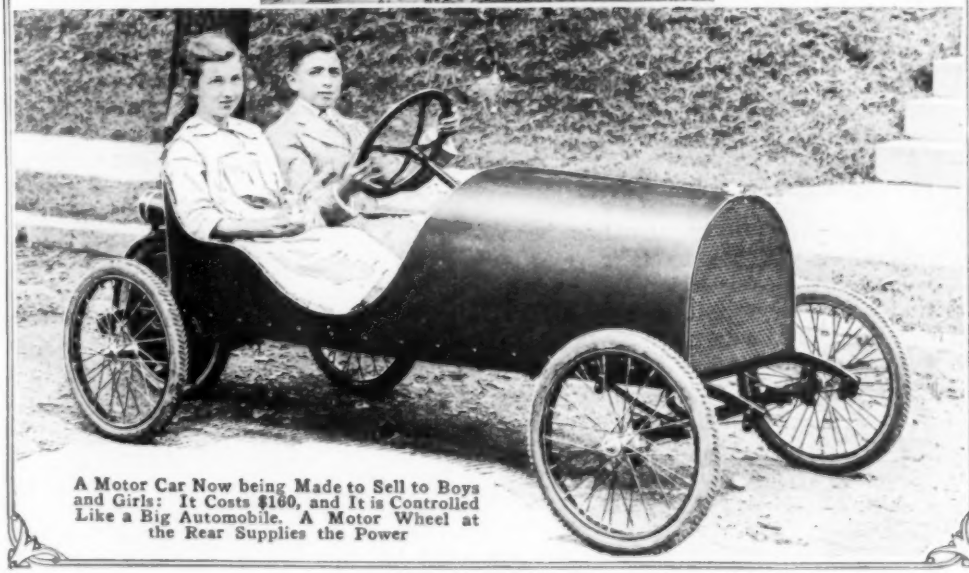
This "Duck Chair" Costs $7 and is Built for Little Toddlers Who Like to Push Themselves About. It is Prettily Painted and Strongly Made

Probably This Is the Smallest Motorcycle in Use: It was Made Especially for This Five-Year-Old Boy, Who Is a Very Clever Rider and Drives It All around Philadelphia. Motors Like This, Attachable to Any Small Bicycle, Are on the Market

FOR CHILDREN OF VARIOUS AGES

The Above View Is Not of Real Soldiers Marching Off to War but of Tin Soldiers Set against a Background Such as Any Child can Make. The Idea Is for the Boy or Girl to Make Settings Which will Appear Realistic When Photographed the Way This One was. The Young Photographer will be Surprised to Find How Natural Settings Made of Clay, Sand, Grass, and Leaves, will Appear in Photographs

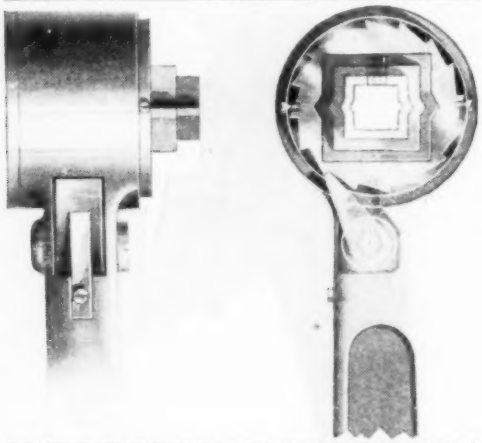
A Real House, but a Very Small One, Built Solely for Children, is Shown on the Left. It is Located in St. Helens, Oregon. There Are Two Rooms and a Wide Porch, and the Windows Open and Shut Like Windows in a Big House. The Best Feature of All Is That It is Heated by a Regular Steam-Heating System and Lighted with Electric Lights. The Steam and Electricity Come from a Near-By Mill



A Motor Car Now being Made to Sell to Boys and Girls: It Costs $160, and It is Controlled Like a Big Automobile. A Motor Wheel at the Rear Supplies the Power

TELESCOPING SOCKETS USED IN NEW RATCHET WRENCH

Three sockets which will fit either square or hexagonal nuts, varying in size from ¼ to 1⅛ in., are nested in the head of a ratchet wrench that has recently been devised for machinists and others. In using the tool no special instrument is needed for adjusting a socket to fit a particular nut. All that is required is that one press back the sockets not needed, leaving one of them free. Furthermore, the sockets can be extended three inches on either side of the head, so as to facilitate the use of the wrench in corners and other close places.



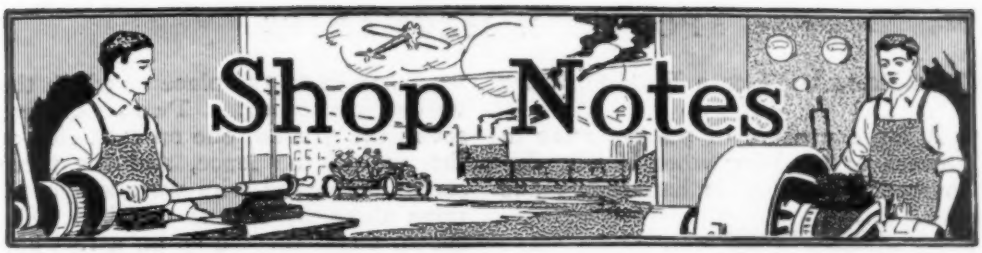
Three Sockets of Different Size are Nested in the Head of This Ratchet Wrench

MOTOR CARS TO BE USED ON OLD RAILWAY LINE

A new railway company has been organized in Kansas to take over a small railroad property located in part in that state, on which it is proposed to run light motor cars. According to tentative plans, the line will be operated from North Platte, Neb., to Hays, Kan., and will make direct connection with a transcontinental line. The service performed by the new company will be similar to that supplied by many interurban trolleys, and stops will be made every few miles, thus bringing the adjoining farm region in more intimate touch with the larger towns. If the plan is carried out with success it will be an interesting example of putting new life into an old line by modernizing the equipment and adapting the service to present-day needs.

RESILIENT STEEL TIRES THAT FIT ANY WHEEL

A steel tire, now being manufactured in Massachusetts, which possesses remarkable resiliency and durability, is being used by a number of motorists in preference to rubber tires and by others as a spare which can be relied on in an emergency. This tire, it is claimed, can be fitted to any rim made. Briefly, it consists of two concentric steel rims, the outer of which is flat. The smaller rim is held within the larger by two rows of closely set coil springs. These rows are set far enough from the edges to avoid scraping when the wheel runs into a rut or against a curb. Between the two rows of springs and attached to the inner surface of the outer rim is a narrow rail which normally does not touch the inner rim. But when there is a sudden heavy shock it acts as a buffer and prevents too severe a strain on the springs. It is said that because of the rims' resiliency they make very little noise when running on hard pavement. Guards to keep sand and dirt out of the springs are not regarded as necessary, and so that much additional weight is avoided. The springs are set so closely together that they exclude all but the finest particles.



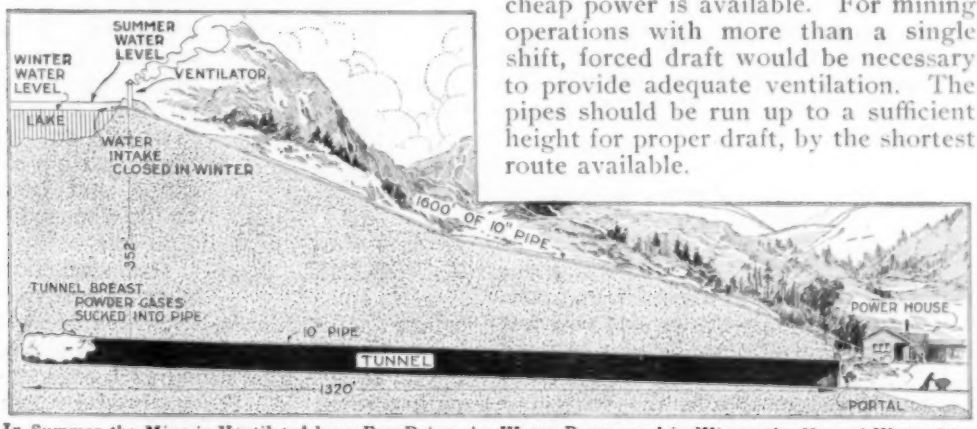
Ventilating a Mine Tunnel

By GEORGE N. STEUART

EXCELLENT ventilation was provided in a mine during the winter seasons, with one shift working, by the installation of the pipe system shown in the sketch. During the summer water power is available from a lake 352 ft. above the tunnel, this fall operating a compressor and water wheel, a 10-in. fan providing air for use at the forge and in the mine. In the winter the water from the lake is not available, and this source of power is cut off until the melting of the snow raises the water in the lake basin.

To provide ventilation in winter, the 10-in. ventilation pipe is connected with the 10-in. water pipe, the water intake being closed. A standpipe with a ventilator head is provided at the lake end of the water pipe, as shown in the illustration. The air moves freely from the ventilator, being aided by the action of the wind, and the fact that the warm air at the tunnel breast will have a tendency to rise in the pipe. The pipe line from the power house to the lake is 1,600 ft., the tunnel is cut into the hillside 1,320 ft., and 100 ft. of pipe was required to connect the line from the portal of the tunnel to the lower end of the water pipe. After blasting down the rock, the powder fumes come from the ventilator quickly, and by morning, when the shift is ready to resume operations, the entire mine—2,400 ft. of workings, closed stopes, or chambers in which the rock is blasted from overhead, with manways, and 50 ft. of stoping—is clear of gas and thoroughly ventilated.

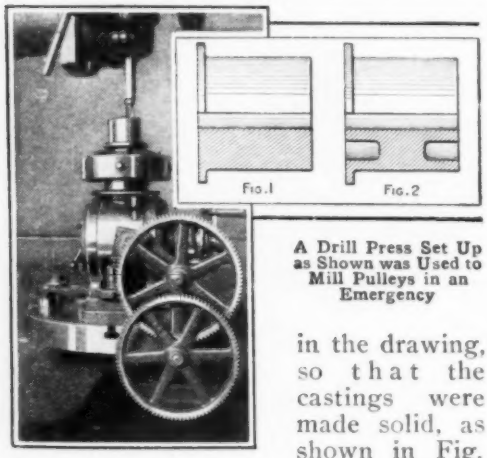
This ventilating system was inexpensive under the conditions, and is suggestive for adaptation in many other similar mining or tunneling operations. The fact that the water pipe is used for a ventilating shaft is a considerable economy, but even if installed complete for the special purpose of ventilation, it should prove efficient and worth while, particularly where no cheap power is available. For mining operations with more than a single shift, forced draft would be necessary to provide adequate ventilation. The pipes should be run up to a sufficient height for proper draft, by the shortest route available.



In Summer the Mine is Ventilated by a Fan Driven by Water Power, and in Winter the Unused Water Line is Connected with the Air Pipe, Providing a Draft Which Removes Powder Gases

Drill Press Used as a Vertical Miller

A large number of pulleys were in process of finishing when it was discovered that an error had been made



A Drill Press Set Up as Shown was Used to Mill Pulleys in an Emergency

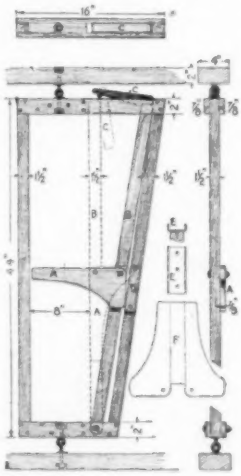
in the drawing, so that the castings were made solid, as shown in Fig. 1, instead of with a web, as in Fig. 2. In order to use the castings it was decided to machine them to the proper shape, on the only machine available, a drill press. The dividing head from the milling machine was not in use on the job which tied up the milling machine, and it was set up on the drill press, as shown in the photograph reproduced. A socket was made to fit the taper of the drill-press spindle, and its other end was fitted to take an end mill. It was necessary to feed or revolve the work by hand, and to avoid the danger of crowding the cutter, the gears were arranged as shown. In this way, by hand-turning, the gear could be moved rapidly without endangering the cutter.—Harvey Mead, Scranton, Pennsylvania.

Stretching Fence Wire with an Automobile

It was desired to build about three miles of three-strand barbed-wire fence, and fence-building equipment was not available. An automobile was pressed into service and the work was accomplished satisfactorily in the following manner: The posts were set ready to receive the wire. The rolls of wire were hauled to the place at which the wiring was to begin. Two posts were set in the ground, one on each side of the end of the fence, and the three spools of barbed wire were supported upon them by means of pipe. The spools could revolve as on a reel and were set at the height at which it was desired to fasten the wire on the fence posts. The free end of one coil was fixed to the automobile, the wire was unreeled, and by driving slowly it was drawn to the desired tension. It was then stapled to the post. In this way the other two strands were also fastened. The result was a fence having the wire drawn tightly and made in comparatively short time.—J. E. King, Dallas, Tex.

Self-Locking Swinging Stanchion

The handling of a large number of cattle in a stable may be facilitated by the use of stanchions which will lock the cows into their places without assistance from the herdsman. Such a device, designed to be made in the farm workshop, is shown in the illustration. It is free to swing, making it comfortable for cattle, and may be fitted into the old wooden standards in combination with other types of stanchions. The trigger may be made of wood or of sheet metal, cut to the proper shape and bent to fit the movable bar.



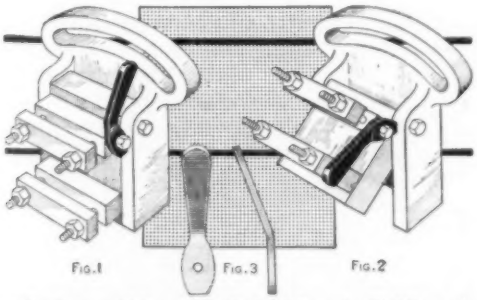
The stanchion is suspended between the standards by means of eyebolts. The frame is built of hard wood, 1½ in. square, and joined with countersunk screws. At the top and bottom the crosspieces are of ⅞-in. stuff, and the movable bar B is fitted between

them. The movable bar is pivoted on a bolt at its lower end and engages a key, C, at its upper end. The key holds the bar back until the trigger A is sprung by the cow, in placing the head into the stanchion. The trigger operates against a block, D, fixed to the side of the frame.

The construction of a metal trigger is shown at F. The sheet metal is cut to the shape shown and folded on the dotted lines. A guide of sheet metal, E, is fixed to the frame to engage the end of the metal trigger. Cattle are released from the stanchion by raising the trigger, the device then being in position for locking automatically when again occupied.—F. H. Sweet, Waynesboro, Va.

Lever Holds Planer Tool Block on Backstroke

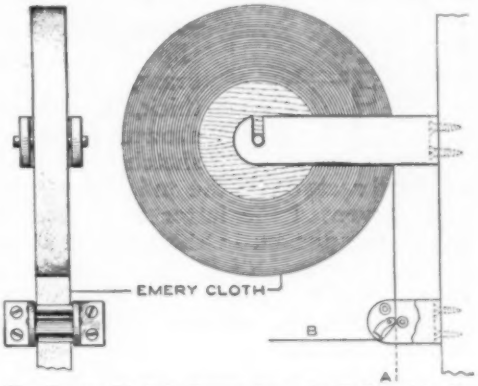
While planing a considerable number of large pieces in a machine shop, and also some long T-slots, I found that my arm became quite lame from lifting the tool block on the planer on the backstroke. I devised the lever shown in the sketch and fitted it on the tool block, making it unnecessary to lift the block. During the cutting stroke the lever is in the position indicated in Fig. 1, and by raising it on its cam surface, as shown in Fig. 2, the tool is held up on the backstroke. The lever is shown in detail in Fig. 3. For raising the tool only slightly above the work, the lever may be attached at the lower end of the block.—Richard H. Jehlicka, Worcester, Mass.



The Lever with a Cam End Makes the Holding of the Tool Block on the Backstroke Unnecessary

Reel and Cutter for Sandpaper and Emery Cloth

Emery cloth and sandpaper are used in rolls in many factories and shops; much waste results when the roll is not properly cared for, so that the workmen may take only such pieces as are required for the work in hand. The reel and cutter shown in the sketch was built to economize emery cloth, which was used in strips. It is simple in construction and may be adapted to rolls of various widths. The roll is carried on a wooden disk, in which an iron rod is mounted as a bearing shaft. The latter rests in a metal bracket, fixed to the wall. Below the reel, and in line with the edge of the roll near the wall, is the cutting device, through which the strip is drawn from the roll. The strip is drawn toward A over a small roller, and then brought to the position B, when it is cut off.—Stephen Bona, Union City, Conn.



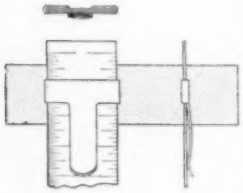
The Emery Cloth is Drawn from the Roll and is Cut Off Squarely by the Cutter

An Emergency Pipe Wrench

Pipes can be handled with an ordinary monkey wrench nearly as satisfactorily as with a pipe wrench, if a small bolt, threaded the full length, is placed between the lower jaw of the wrench and the pipe to be turned. The jaws of the wrench must be drawn up closely before attempting to turn the pipe.—George L. Yaste, Lonaconing, Maryland.

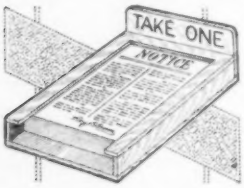
Clip for Pocket Scale

The annoyance of having a scale slip from the pocket is experienced by most mechanics, and in order to overcome this nuisance, I made a clip of sheet brass, 1/32 in. thick, like that shown in the sketch. It was clamped securely to the end of the scale and prevented the latter from falling out of the pocket. Others in the shop thought so well of it that in a short time many had made clips similar to mine.—John I. Blaker, Worcester, Massachusetts.



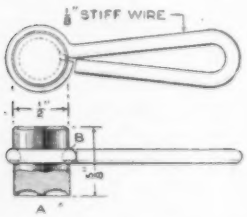
Tray for Counter Advertising Matter

Handbills, or other small printed matter for distribution on counters in stores, easily get out of order, both through carelessness and the likelihood of drafts blowing the paper about. The holder shown in the sketch attracts attention to the handbills and keeps them readily available, yet in a neat pile that cannot be easily disturbed.—J. J. O'Brien, Buffalo, N. Y.



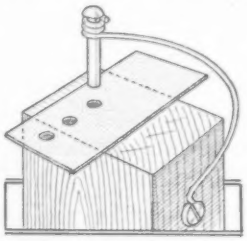
Key-Ring Riveter

The small riveter shown in the sketch was made to be carried on a key ring in the pocket, and is convenient for use with hollow or tubular rivets. It was made of a piece of steel, 1/2 in. in diameter, turned in a lathe to the shape shown at A, on one end. A groove was turned around the piece, at B, and a stiff 1/8-in. wire was fixed around it and a handle formed on the other end. The handle is slipped onto the key ring, and the device may be used without removing it from the latter. A sharp blow from a hammer on the upper end of the riveter causes the rivet to spread neatly.—R. S. Matzen, Fort Collins, Colorado.



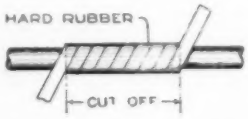
Device for Punching Holes in Sheet Metal

A 1/2-in. bolt held above a wooden block by means of a wire, as shown in the sketch, was used to punch holes in No. 24-gauge sheet iron, and smoothly cut holes resulted. The block was of hard wood and a 1/2-in. hole was bored into the end grain to act as a die for the bolt. The wire was convenient in that it held the bolt out of the way while the strip of metal was shifted. A better die could be provided by placing an iron plate with a 1/2-in. hole through it on top of a block, arranging it so that the bolt registers over the hole.



Hard-Rubber Bushing Made without Lathe

A narrow strip of sheet hard rubber, wound spirally around a rod of appropriate diameter, can be used to make a bushing for electrical work, nearly as useful as one turned up on a lathe. When the work is begun, the rubber and the rod should be heated slightly. Hold the ends of the rubber until it cools, and it will remain in shape as shown in the cut. The ends may either be filed off or nicked with a sharp knife and broken at the dotted lines.—Frank L. Whitaker, Clay City, Ind.



The Woman's Home Workshop

By Avis Gordon Vestal

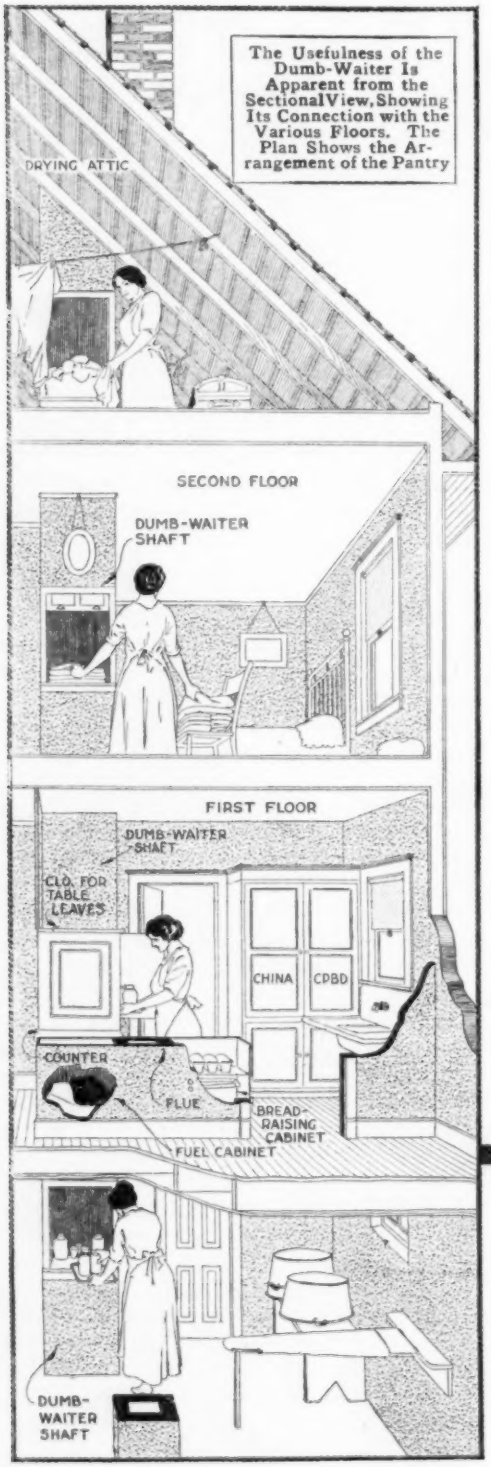
Part III—Built-In Features and Details Adaptable to Various Kitchens

[This is the final article of the series, in which Mrs. Vestal, "domestic engineer," sets forth the mechanics of the kitchen, illustrating fundamental design and details with practical examples. This installment is complete in itself, but will be more fully appreciated in connection with the others, which appeared in the October and November issues.—Editor.]

BUILDING a kitchen as an integral part of a new home, with every feature carefully planned, is no doubt the ideal method of making the woman's home workshop what it should be. However, lacking this opportunity, the resourceful housewife need not despair of having a practical kitchen, if she will but study the possibilities for improvement. The details of construction and equipment described in this article offer numerous suggestions, and may be included in the design of a new kitchen and allied rooms, or adapted to various other situations. Many of them may be carried out by the woman of the house herself, others may require the aid of the men of the household, and the more extensive ones may be undertaken only by competent workmen. An installation of the latter type is the dumb-waiter and shaft, as shown at the left in the double-page illustration. The receiving shelf and dust and paper chutes, shown in the plan at the right, may be built by a man of fair mechanical skill. The economical arrangement of kitchen tools and supplies, as suggested on the right, is easily within the range of the able housekeeper. A practical refrigerator built under a sink, drawers and storage space provided under a stairs, and a convenient warming oven over a radiator, are shown in the smaller sketches.

The pantry connected to the various floors from the basement to the attic by the shaft and dumb-waiter was designed by experts from a state agricultural college for a modern farm home. It is situated between the kitchen and the dining room, facilitating the serving of meals, and keeping the heat from the cooking range from the dining room. The dishwashing is done here, and china cabinets as well as other storage spaces are close at hand. The sink is provided with ample drain boards, and receives plenty of light from a large window. The sliding door is economical of space, and practically all of the wall space is utilized. By reference to the first floor of the vertical section at the left, the plan of the pantry may be understood readily.

On one side of the flue is a bread-raising cabinet, warmed by a coil of the water pipe, which extends from the reservoir of the kitchen range to the bathroom on the floor above. It is metal-lined and provides space for a large batch of loaves. On the other side of the flue is a storage space for coal and other fuel for the kitchen range. In the adjacent corner is the dumb-waiter shaft, and adjoining it, opening to the pantry, is a cupboard for storing extra table leaves, and other articles of only occasional use. Between this cabinet and the flue is a counter of table height, opening from the pantry to the kitchen.

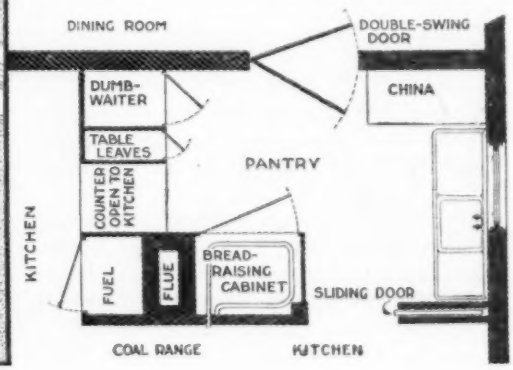


The Usefulness of the Dumb-Waiter Is Apparent from the Sectional View, Showing Its Connection with the Various Floors. The Plan Shows the Arrangement of the Pantry

The utility of the dumb-waiter in affording a time and labor-saving connection between the kitchen pantry and the other floors of the house is evident from the several uses suggested in the illustration. In the bottom of the shaft, and served by a separate carrier, which can be raised to the pantry only, is a cooling pit for the storage of foods, since ice was not available. Supplies and the articles to be laundered or ironed are raised from or lowered to the basement. Fuel is also handled in this way. The linen is brought to and from the upper rooms and the laundered articles are taken to and from the attic by means of the dumb-waiter. Numerous miscellaneous uses, that will save the housewife many steps, will easily suggest themselves. The various features of this arrangement may be adapted singly to particular kitchen problems.

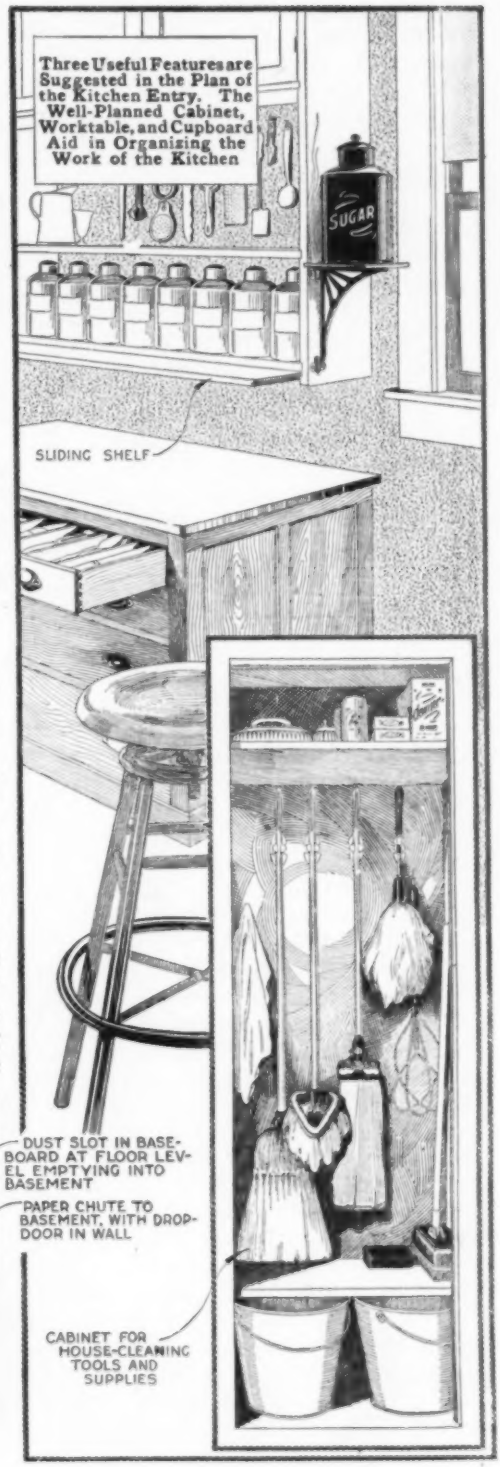
The plan on the right shows several details of a kitchen entry having considerable merit. The outer door is at the grade level and from its vestibule one stairs leads down to the cellar and the other up to a landing at the level of the kitchen floor. Convenient to the kitchen door is a shelf for receiving supplies from delivery men. Opposite it are two chutes emptying into the basement, where receptacles are provided for the sweepings and paper which are swept to or placed in the drop doors. The dust chute has a slot in the baseboard provided with a drop door, and the other chute has a door in the wall.

The great miscellany of cleaning

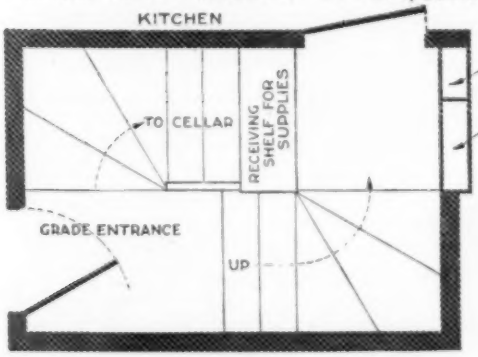


tools, supplies, and other small kitchen equipment may easily give the appearance of continual disorder unless specific places are provided for their proper storage. The items of undue wear, breakage, and waste are of consequence also. A good plan is to store these articles according to their classification and place of use. The cleaning equipment and supplies may be placed in a cupboard, as shown in the illustration at the right, and the cupboard itself again subdivided with care, to provide a good place for each article. Several shelves, caring for the lighter articles above, and the heavier or more bulky ones below, are desirable. Brooms, mops, and similar cleaning tools should be hung on catches, so that the working parts may not be injured. Opportunity for economical and compact arrangement of individual cupboards is almost unlimited, and affords an interesting problem.

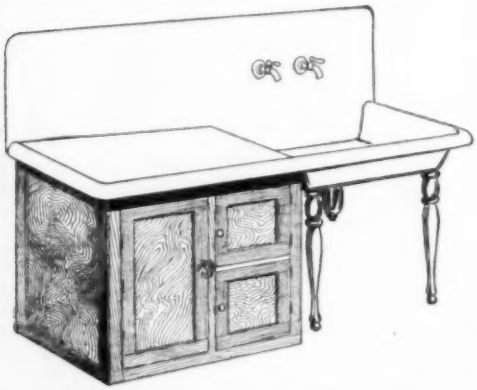
The storage of the tools and supplies needed for the preparation of food, baking, etc., may profitably be given careful study. An arrangement of the tools and materials most needed, convenient to the worktable, is shown in the illustration at the right. The smaller tools are hung on the back of the open portion of the cupboard, with silhouettes of the various tools marked at their respective places. Heavier articles, that are not suitable for hanging in the cupboard, are placed on the shelf below the open portion. On another shelf is a row of cans, labeled, and containing various food materials. A receptacle



Three Useful Features are Suggested in the Plan of the Kitchen Entry. The Well-Planned Cabinet, Worktable, and Cupboard Aid in Organizing the Work of the Kitchen



for sugar may be placed handily on a bracket shelf at the end of the worktable or at the side of the cupboard, not too high up. The sliding shelf at the lower edge of the cupboard is convenient as a temporary rest for various articles. Additional storage space for articles not used so frequently is provided in the closed cupboard above. Doors on all cupboards in the kitchen should be considered carefully, as to available space, and possibility of damage to them, if left open. Sliding doors, particularly those that slide vertically, are economical of space.



A Refrigerator Built under a Sink Drain Board in a Kitchenette Proved Economical and Useful

The worktable is provided with several drawers, which are graduated in depth from the shallow one at the top to the deepest at the bottom. The upper drawer is subdivided into sections by small strips, and each section is marked with a slip indicating the tool or article which belongs there. The smaller articles are kept in the upper drawers and those more bulky in the lower ones. The stool shown near the worktable has many uses in the kitchen, and will save the housewife much useless drudgery in performing work at which most women stand, once the habit of using it has been formed.

Most of the shelves in cupboards should be narrow, and provide for only one row of articles, or receptacles. The inner side of swinging doors may be fitted with wire racks for the keeping of covers and similar flat objects. Narrow shelves, either fixed or hinged to drop out of the way when not in use, are convenient for special uses, such as for a clock, scale, etc. They may be enameled white and made so that they can be lifted out of place and washed easily. If it is desired to provide inexpensive or temporary covering for open shelves, roller curtains may be fitted to them, or denim curtains, to slide on an upper and a lower rod, may be used.

For the cooking cabinets, sliding drawers are preferable to tilting bins for the storage of flour and similar supplies. The bins are usually narrow, and it is necessary to stoop uncomfortably to remove all of the contents. They also are likely to catch the fingers, especially when well filled. Drawers for such purposes should be tin-lined and covered, the back portion being fixed and the front part of the cover hinged to be raised forward when the drawer is opened slightly over half its length. Tin does not absorb odors, is mouse and bug-proof, and is easily cleaned. The drawers may be removed readily and carried out of doors for sunning.

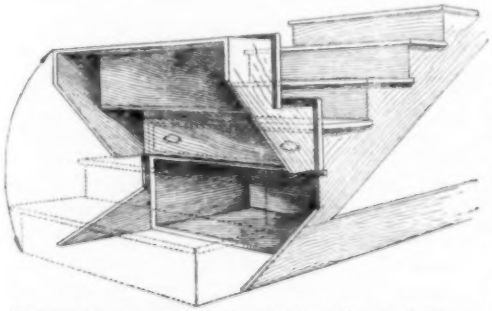
A number of other features making for kitchen efficiency, and which may offer suggestion for adaptation to particular conditions, will be treated briefly, without attempting to relate them systematically to the various kitchen industries. The first of three such items, shown in separate illustrations, is the installation of a refrigerator under the drain board of a sink. It was designed for use in a kitchenette, where space was limited. Another suggestion for a refrigerator, practical but not new, is the fitting of a box to a window, for use in the colder months. A cooling pit for the country home has already been mentioned in connection with the dumb-waiter, shown in the double-page illustration.

An interesting use of space otherwise wasted is the building of drawers into the risers of stairs, and the hinging of a section of several treads at the bottom of a stairs, to form a cupboard beneath them, as shown in the sketch.

These adaptations may, of course, be used separately. A small cupboard, such as is commonly used in bathrooms, was set into the wall of a kitchen, above the sink, and proved useful for the storage of brushes, powders, and other cleaning materials.

Table service is improved, especially in winter, by the use of warmed plates. The warming oven above a radiator, as shown in the illustration, was made for this purpose, and is useful also in preventing the cooling of food to be served.

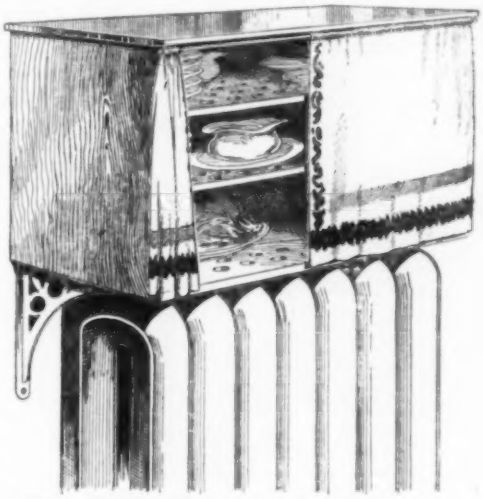
When ironing must be done in the kitchen, a special cupboard for the supplies and equipment is desirable. This may often be combined with a storage space for cleaning tools. Several places affording the best light for ironing at various hours of the day should be selected and hooks fixed in the walls, or other supports, for the ironing board. A board hinged or hooked to the wall at one end, and supported by a strong brace, affords a free end that is often desirable. If this method is not feasible, a portable board with firm supports, that may be folded into small space, should be provided. A mat of rubber, composition, or other suitable material, should be placed on the floor, beneath the feet of the person ironing, as this saves much strain in ironing with heavy pressure. For many kinds of work not requiring this, it is convenient to sit on the kitchen stool. A



Storage Space may be Provided in Unusual Places, as Suggested by the Drawers Built into the Risers and the Cupboard under the Hinged Section of the Stairs

wheeled table or clotheshorse, both of which may be made in the home workshop, should be convenient to the ironing board.

In the selection of equipment for the kitchen various practical and space-saving articles manufactured commer-



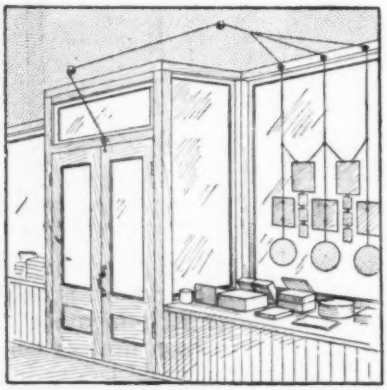
A Warming Oven Built over a Radiator Keeps Food and Dishes Warm in Cold Weather

cially, some of which may be duplicated by the home worker, should be considered. Thus a homemade "hay stove" may serve as a fireless cooker. A combination chair and ladder is useful. Where children are to be cared for, a "one-arm" chair, with a fixed or removable arm, may be used for play as well as lunches. A small table that may be adjusted as a chair, and which has a cupboard for children's toys, is also economical of space. By far the most useful of such items of extra equipment is the familiar tea wagon, adapted for use in the kitchen. It may be used to carry clean dishes and hot food to the dining room, or to the porch in summer, and to return dishes and left-over food to the kitchen. It is a universal side table in the kitchen and allied rooms, and invaluable in the canning season. Such a table should be narrow enough to pass through doors easily, and the top should be covered with zinc. Other useful features are a drawer for silver and a shelf below, for soiled dishes. A detailed sketch of such a wagon was shown in describing the equipment of a farm kitchen in the first article of this series.

Merely rearranging the furniture in a kitchen for convenience often brings about marked improvement. If the cooking and the work directly related to it are concentrated on one side of the room, and the other side is reserved for other industries, a basis for the placing of the equipment is established. The two fundamental principles to be observed are: equipment and materials used together should be placed accordingly; and working surfaces should be suited to the height of the person using them, 30 in. being correct for a woman of average height. By adapting some of the suggestions outlined, and rearranging the equipment, even a kitchen quite out-of-date may be improved.

Novel Window Advertisement

A simple means of providing a novel advertisement for the show window



The Arrangement of Cords from a Window Display to the Door Causes the Former to Move Up and Down, Attracting Attention

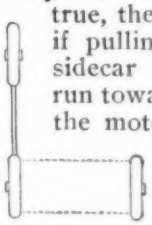
of a store is shown in the illustration. A number of pictures, post cards, etc., are arranged on three cords which travel in pulleys at the top of the window sash. The three cords are joined and conducted through three intermediate pulleys; the end of the cord is fixed to the top of the door. Three colored disks are suspended below the window display. Whenever the door is opened, the window display and the disks are moved up and down a distance of about two feet, and attract much attention.—G. F. Thompson, Pittsburgh, Pa.

Templates for Cutting Packing Gaskets

Many forms of packing for machinery, pipe joints, etc., are expensive, and the careful maker of them will economize in material. By making a set of templates cut to the exact size of the various gaskets used on the steam chest, cylinder head, pipe flanges, and other machinery parts, there is not only an economy of material but of time. In some instances such templates may even prevent dangerous accidents, which may result while a gasket is being fitted by the usual method of cut and try. When cutting up packing material it is desirable to cut gaskets of various sizes, using the templates, so that they may be on hand when needed, and this also aids in cutting the stock to the best advantage.—C. Anderson, Worcester, Massachusetts.

Alining Wheels of a Sidecar or Automobile

If the wheels of a vehicle, particularly a sidecar motorcycle, do not run true, the motor is overburdened as if pulling an extra load. If the sidecar wheel has a tendency to run toward the right, then, to make the motorcycle go straight ahead, it is necessary to keep the front wheel turned slightly to the left. Both the motor and the tires receive undue wear. A method of alining the wheels is to measure the distance between them at the points indicated by the dotted lines in the sketch. If they do not measure the same at these points, proper adjustment should be made on the cross rods. In the case of an automobile the test is the same although the adjustment is more difficult, especially if the axles are bent. In that case professional attention is required.—L. E. Turner, Jamaica, N. Y.



Lights behind Storage Batteries Indicate Charging Periods

The storage-battery room for most office telephone exchanges is situated in a compartment which has to be artificially lighted. It is difficult, therefore, to ascertain when a battery is charging or what the condition of its plates and solution is without an examination with a flash light. An electrician in charge of such a battery room placed a row of miniature incandescent lamps behind the line of batteries. Each shelf of batteries has its row of lamps. These lamps are switched on, a row at a time, and the batteries examined. The light shining through the solution shows the bubbles rising when the battery is charging properly. Any buckling of the plates can be seen at a glance and the trouble remedied before further damage is done.

Preventing Snow from Clinging to Shovel

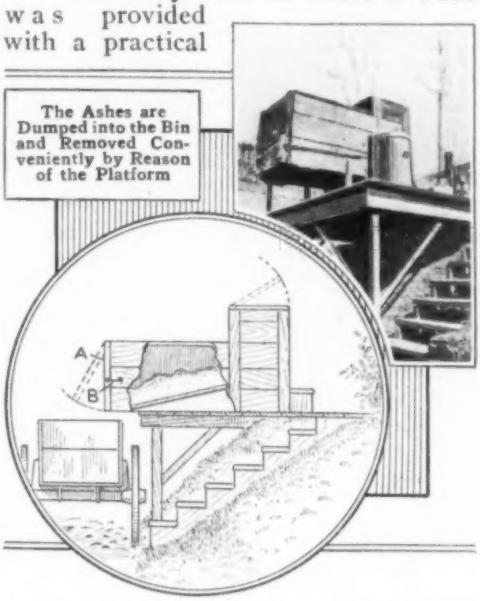
A coating of paraffin on an ordinary snow shovel, of metal or wood, will prevent the snow from sticking to it, and will give service for heavy shoveling for a number of hours. The paraffin may be applied to a metal shovel by heating the latter over a stove and flowing on the protective covering. The molten paraffin may be brushed over a wooden shovel easily if the shovel is warmed.—C. D. Ryan, Seattle, Wash.

Sound-Proof Pump Connection

Windmill pumps are sometimes troublesome in that the pumping noises are communicated to the house, causing a monotonous dull thumping whenever the mill is in operation. Metallic pipe lines are good conductors of sound, and by interrupting the metal lines, sound transmission will be interfered with. A short piece of rubber hose at the pump, to connect it with the pipe line, will effectively overcome the transmission of the noises.

Elevated Bin Makes Ash Disposal Convenient

An apartment house in a section of the city in which collections of ashes are made only once or twice a week was provided with a practical



The Ashes are Dumped into the Bin and Removed Conveniently by Reason of the Platform

container for the ashes, which saved both space and labor. A large box was built on a platform, as shown in the illustration. The ashes are poured into it from day to day at the hinged lid. The bottom of the box slants down toward the alley, so that when the wagon drives alongside the platform, it is only necessary for the driver of the ash wagon to open the door A, by lifting the hook B, and the ashes are discharged into the wagon with a minimum of handling.—Hamilton A. Hooper, Baltimore, Md.

Keeping the Point of a Nail Set in Shape

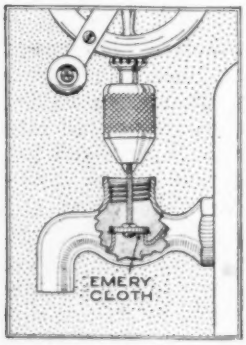
Not infrequently woodwork and often fingers are damaged by the use of a nail set having a smooth point. A simple way to overcome this difficulty without attempting to make a cup point, as on commercial nail sets, is to file grooves at right angles into the point, with a triangular file.

Chain-Rivet Extracting Tool

Roller-chain links are easily injured when gripped in the jaws of a vise in order to remove the rivets. The tool shown in the sketch was forged in a garage from a piece of scrap steel, and is useful in handling links without injuring them. The rollers of the link to be repaired are placed in the recesses of the device, as shown in the sketch, and the whole is then clamped into the vise, for the removal of the rivets.—H. W. Offins, Grants Pass, Ore.

To Repair a Worn-Out Spigot

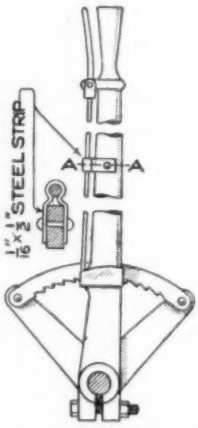
When new washers do not remedy a leaky spigot, the valve seat has usually been worn rough from sand or other particles. It can be reground in the following manner, with little difficulty or expense: A 2-in., 8-32 round-head machine screw and nut, a small piece of No. 1 emery cloth, a washer of the proper size to fit the spigot, and an ordinary hand drill are needed for the work. First cut a round piece from the emery cloth, slightly larger than the spigot washer, punch a hole in the center, and place it on the machine screw, with the abrasive side facing the head. Then put on the washer and nut, tightening the latter. The end of the screw should then be fastened in the drill chuck, and the valve grinder will be ready for use.



Turn off the water supply, remove the valve plunger, and dry the inside of the spigot with a cloth. The grinder should then be inserted and firmly held erect, as shown in the sketch, and the crank turned at a fair speed until the valve seat is ground smooth and free from pits. By treating it in this manner and reassembling with a new washer, any spigot can be repaired to be practically as good as new.—Edwin L. Powell, Takoma Park, D. C.

Brake-Lever Rod Guide

The pull rod on the brake lever of an automobile was a source of constant annoyance resulting from its continuous rattling against the lever. A piece of strip steel, A, was bent in the shape indicated in the sketch, and was then riveted to the lever midway between the ends of the rod. This little guide prevented the lever and the rod from touching each other, and the trouble was eliminated.—Adolph Klein, New York City.



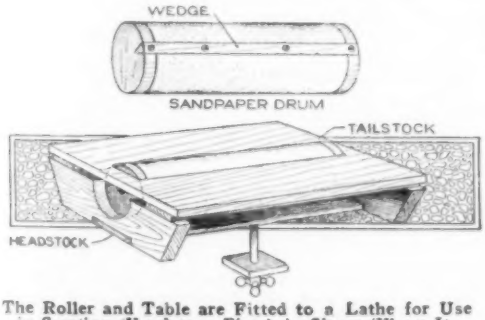
Sand Racks for Storage Batteries

In a storage-battery room considerable damage resulted from the acid which frequently leaked or spilled from the jars. The jars were placed in long rows on wooden racks, and, due to the destructive effect of the acid, the wood soon decayed. To eliminate the expense of frequently renewing the racks, larger shelves were built with sides 3 in. high. Into these boxlike racks sand was placed to a depth of 2 in. The glass storage-battery jars were then placed on this sand bed, and more sand was packed around them to a further depth of 1 in. Acid escaping from the jars was thus absorbed by the sand, leaving the wooden containers undamaged.—K. M. Coggeshall, Webster Groves, Mo.

Sander Attachment for a Lathe

In a small shop, where the sanding to be done did not warrant the purchase of a sander, the device illustrated was fitted into a lathe and performed its work to thorough satisfaction. The dimensions of the table and roller will be determined largely by the size of the lathe to which the device is to be fitted. The drum carrying the sandpaper should be about 6 in. in diameter, in order to give the necessary speed for good work in sanding. A medium grade of garnet sandpaper was used for all ordinary work, but other grades may be used if a specially fine finish or heavy cutting is required. The sandpaper is fitted to the drum by drawing it around tightly and clamping it into place by means of the V-shaped spline fitted into a groove, and fastened with countersunk screws. The sandpaper may also be glued to the drum instead of using the strip-and-groove device.

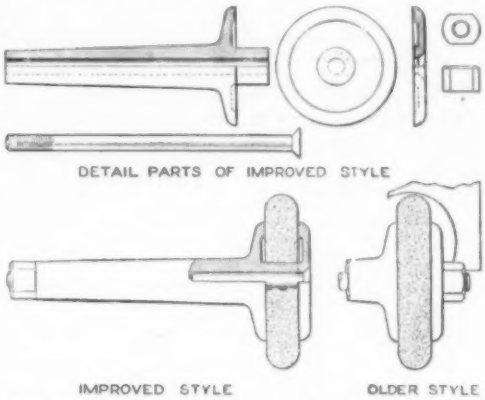
The roller is supported in a strong frame, built of hard wood. Its ends are fitted to the fixed support of the headstock and of the tailstock, and the device clamped firmly to the lathe bed by means of the rod, plate, and clamping wheel, below. The projection of the roller above the surface of the table may be regulated by supporting the back of the table on a wooden rest, adjustable, vertically, on two machine screws engaging nuts set into the rest. The roller must be set in the lathe between centers carefully, and the tailstock center kept oiled.



The Roller and Table are Fitted to a Lathe for Use in Sanding Wood to a Finish in Shops Where It Is Impracticable to Purchase a Sander

Improved Emery-Wheel Arbor

An arbor for use with emery wheels, or similar grinding wheels and disks, is shown in the illustration in comparison with a type commonly used. The improved type insures a firm grip on the wheel, causing it to run more steadily and true in spite of frequent change of wheels. With the older type, in which the wheel is held in place by a flange and nut, set on the end of the arbor, the nut interferes with certain kinds of grinding, and is an obstruction in working from the side of the wheel.

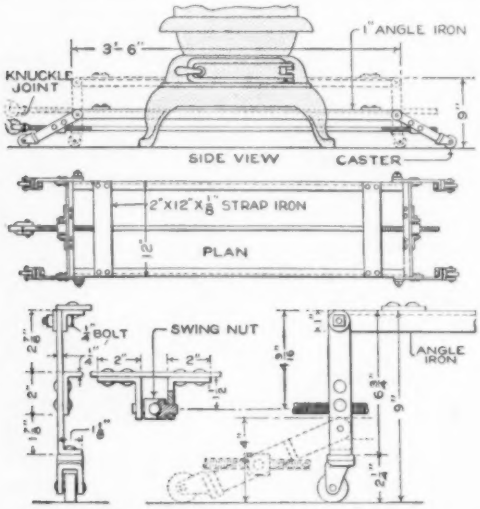


The Improved Style of Arbor for Emery Wheels Gives an Unobstructed End and Grips the Wheel Firmly

The improved style of arbor overcomes these difficulties, clamps the wheel securely, with a smooth, unobstructed face on the side of the wheel and flange. The undercut flanges give a better fit to the surface of the emery wheel, and aid in keeping the wheel running true. The arbor, as shown in the detailed sketches, is bored out through its center, and a steel rod, threaded on one end, and with a flat head on the other, is fitted to it. The arbor and inner flange, as well as the bearing shaft for the wheel, are in one piece. The outer flange is bored and countersunk to fit the center rod, and the wheel is clamped between the flanges by means of a nut drawn up on the opposite end of the arbor rod. The arbor is, of course, tapered to fit the socket in which it is used.—Andrew J. Rutz, New Haven, Conn.

Stove-Lifting Truck of Varied Uses

The moving or setting up of a stove is often a difficult task, especially in the home where it is undertaken by one



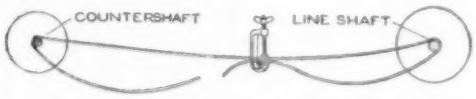
The Truck is Lowered, Rolled under the Stove, and Raised Until the Stove is Lifted from the Floor

man. Damage to woodwork and floors results, with the possibility of damage to the stove and injury to the householder. The truck shown in the illustration was built particularly for the lifting and moving of stoves, but may be used for many similar purposes, such as the transportation of heavy boxes, trunks, and furniture. It is useful in stores and shops as well as in the home. It is set low enough to permit rolling it under the stove, as indicated in the upper sketch, and by turning the removable tongue by which it is drawn, the truck is raised until it lifts the stove from the floor. The large ball-bearing casters will not mar the floor, except under very heavy loads, in which case it is desirable to protect the floor with strips of wood or even heavy cardboard.

The truck is strongly built, and consists of a frame made of 1-in. angle iron, braced near the ends with two pieces of 1/8 by 2 by 12-in. strap iron, as shown in the plan. The end supports of the truck are pivoted where they join the top, a detail of the joint being shown in the lower sketches. A strap of iron extends across each end of the truck, and at the center of each strap is a swing nut, threaded to receive the long round rod, which is supported at each end, and turned by means of the tongue. One end of the rod is threaded with a right and the other with a left-hand thread, so that the raising and lowering action is equal at both ends of the truck. The fixed joints of the frame and connections are riveted and the others are fitted with stove bolts. —P. J. Backus, Delphos, Ohio.

Kink for Lacing Machine Belts

Frequently, in lacing machine belts on revolving shafting, or among pulleys at the ceiling, it is dangerous to attempt the work without the aid of some one to hold the ends, to prevent the belt from turning when the power is on. To shut off the power is sometimes undesirable. A convenient method of holding the belt ends, so that one man may lace them, is to apply a clamp, as shown in the diagram, the belt being looped around the shafts in its usual position. When the lacing is completed the belt is replaced on the pulleys, the safe method being



The Clamp Holds the Belt so That One may Lace It

to stop the machinery, although an experienced man can easily replace it while the shafts are in operation.—J. Harger, Honolulu, Hawaii.

Removing Fence Posts Easily

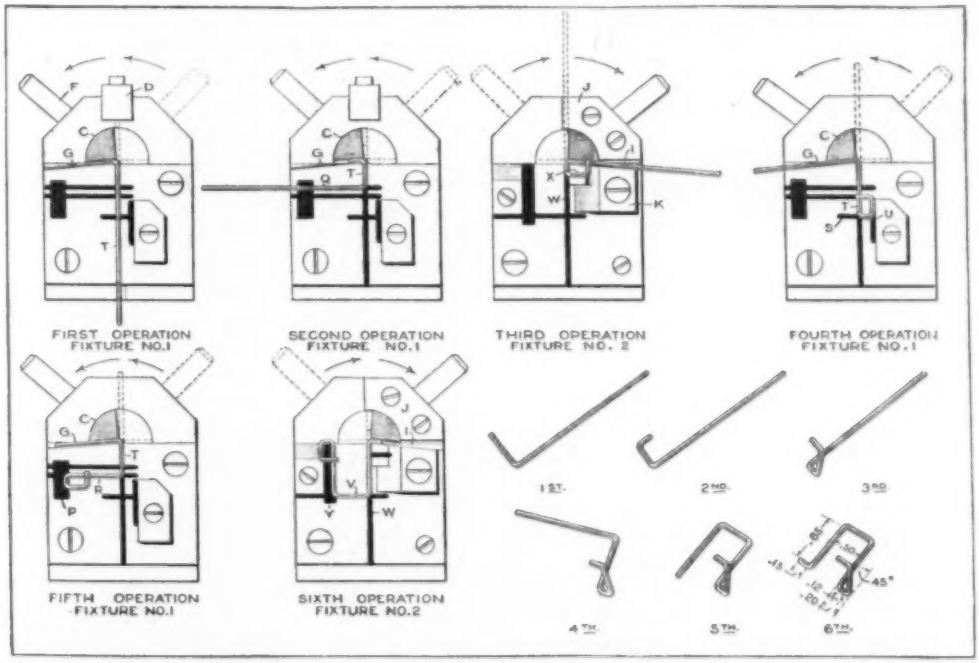
Fence posts of considerable size may be removed readily by hitching a chain around the post near the ground and passing it over a piece of two-by-four stock set at a slant against the post. A horse hitched to the chain can withdraw large posts by means of the leverage on the chain and the piece of wood. —Will Chapel, Manchester, Ia.

Hand-Operated Wire-Forming Fixtures

By GEORGE P. BREITSCHMID

PRODUCTION of machine parts, and other small devices of formed wire, is often more economical by the use of hand-operated fixtures than by the installation of more or less automatic machines. This is the case especially where a small number of pieces are to be made, for a small order, or for the replacing of broken parts from time to time. The hand-operated wire-forming fixtures shown in the illustrations were designed primarily for the making of a stopping lever, the function of which is to stop automatically a machine for winding thread, when the thread breaks or the bobbin is empty. They are directly adaptable to a large variety of similar work, by the addition of special plates and parts, two of which are suggested. By application of the principles of design involved, fixtures for the making of wire parts for sewing machines, typewriters, adding, stamping, sealing, and vending machines, toys, loose-leaf appliances, household utensils, and similar work, may be devised. The operation of the fixtures and the wire lever which is formed in them, are shown in the diagram. On the page plate are shown the detailed working drawings of the fixtures and their parts, a sketch of the main device in use, Fig. 6, and two adaptations useful in the making of formed parts similar to that shown: a right-angle plate, and a stop arrangement for bending wire at various angles in the fixture, in Fig. 7. The base is clamped in a vise, as shown in Fig. 6, and the wire is formed by setting it in the proper grooves, so that the revolving anvil may be brought against it by means of the handle. The device is of small size, being about 2½ by 2½ by 4 in. in over-all dimensions.

Before attempting to study the construction in detail, it is desirable to identify the main parts and to trace their operation in forming the stopping



The Operations Necessary for the Forming of the Stopping Lever are Shown in Detail, and the Tracing of the Process through the Diagrams Makes Them Strikingly Clear. The Dotted Lines Indicate the Original Position of the Wire, the Handle, and the Wiper, and the Arrows Show the Direction of the Bending Force

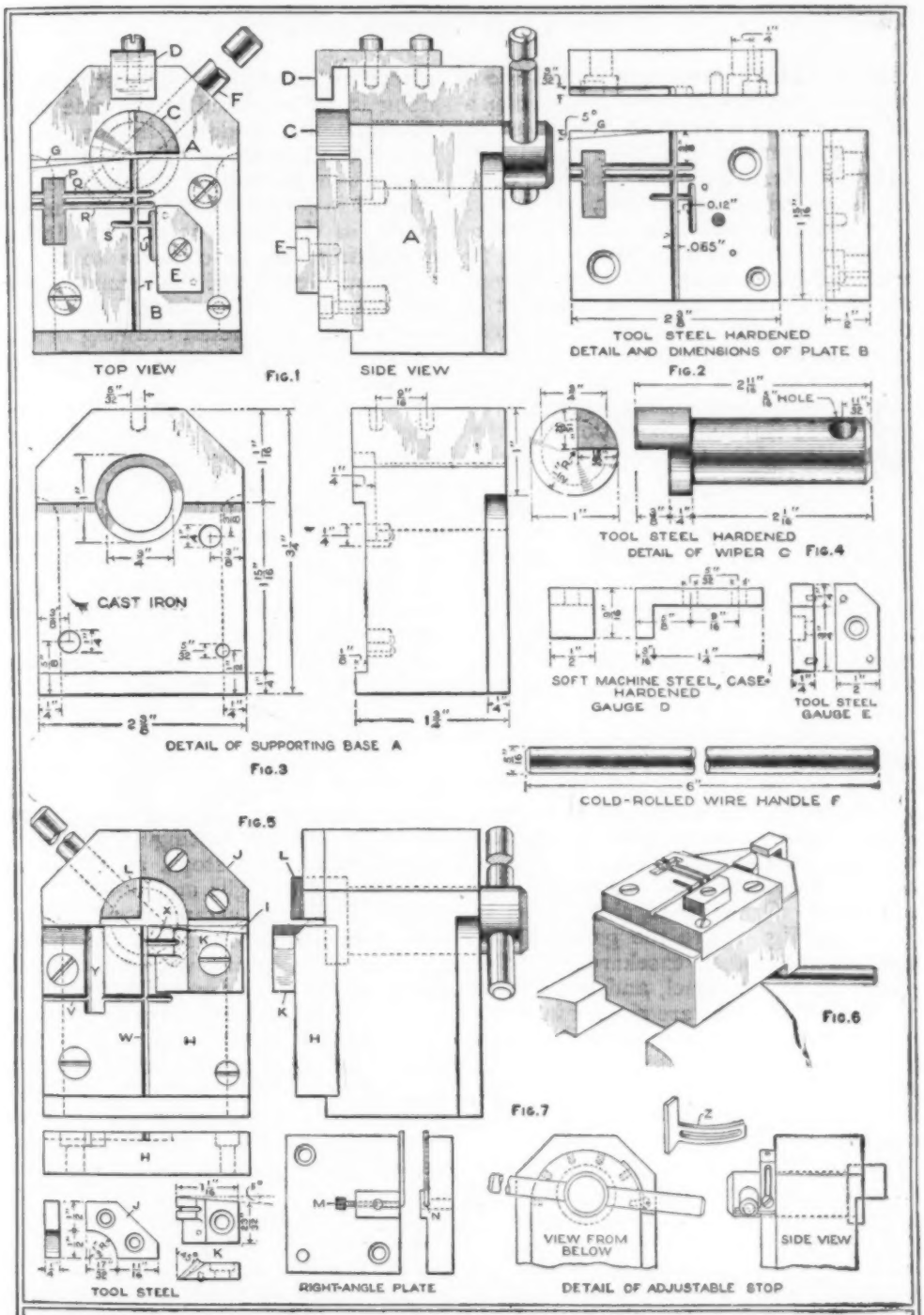
lever through the six operations required, as shown in the diagram. The lever is shown finished and with dimensions, as the result of the sixth operation. As indicated by the minute decimal dimensions, it must be made accurately, No. 26 music wire, .063 in. in diameter, being used. Referring to Fig. 1 of the page plate, the chief parts are designated by the letters A to F, slightly larger than those indicating the minor parts. A cast-iron base, A, carries the other parts. The forming plate B, of tool steel, hardened, is fixed to the top of the base with flat-head machine screws. The forming wiper C, with its upper end formed into a sectorlike anvil, also of tool steel, hardened, rests in the base on its upper shouldered portion, and projects below it, providing a fastening for the handle F. The gauge D is used in placing the wire properly, and is made of case-hardened, soft machine steel. The gauge E is made of tool steel, hardened, and is held in place on the plate B by means of a flat-head machine screw and two small pins. The handle is a piece of cold-rolled wire, 5/16 in. in diameter and 6 in. long. Two forming plates are required, one being used for the first, second, fourth, and fifth operations, and the other for the third and sixth operations, as shown in the diagram. In connection with the second forming plate, shown in Fig. 5, a special rest, K, of tool steel, is provided, in order to make the 45° bend in the lever. The special rest J, also of tool steel, is added to give a bearing for the wire during the third operation.

The six operations, as indicated in the diagram, result in the shapes of the wire marked correspondingly. The pieces from which the lever is formed are cut to a length of 3¼ in. A piece of wire of this length is inserted into groove T for the first operation, the gauge D being set so that the portion bent to a right angle is sufficient for the making of the additional bends, as indicated by the detailed dimensioning of the lever. This was determined in part by experiment. The handle F is brought from the position indicated by the dotted lines, carrying the wiper C with it, as indicated by the arrows. The portion bent is carried slightly beyond a right angle in each instance, against the beveled edge G, to allow for the return spring of the wire. This must also be determined in part by experiment, for the particular stock used.

The wire is placed in slots Q and T for the second operation, the projecting end to be bent being shown by the dotted lines opposite the slot T. Fixture No. 2, with the forming plate shown in Fig. 5, is used in the third operation. The portion of the wire previously bent is rested in the grooves W and X, the latter in the rest K, and the straight portion is extended to rest upon the rest J. The handle is drawn as indicated by the arrows, and the bend is made against the beveled edge I. Reference to the sketch showing the shape of the wire after the third operation will make this clear. The fourth operation is performed on fixture No. 1. The wire is set as shown, with the straight end extending as indicated by the dotted lines opposite the groove T, and with other portions of the wire in grooves S and U. It is bent against the beveled edge G.

The bent portions of the wire are set into grooves R and T, and into the clearance hole P, for the fifth operation. The bend is made in the same direction as in the fourth operation. The sixth operation is performed on fixture No. 2. The wire is placed in the grooves V and W, with the 45° end in the clearance hole Y, and the portion to be bent extending beyond the end of groove W, as indicated by the dotted lines. The bend is made against the beveled edge I. This completes the forming operations, and the stopping lever is shaped to the form shown with dimensions.

The details of the various parts of the forming fixtures are shown in the page plate. The general arrangement and method of joining the parts is shown in the top and side views, Fig. 1. A detail of the plate B is shown in



These Hand-Operated Fixtures for the Forming of Wire into Small Parts of a Machine Proved Economical from the Standpoints of First Cost, Application to a Wide Variety of Work, and Ease of Operation by Unskilled Labor. The Working Principles Involved may be Adapted to the Making of Wire Parts for Many Kinds of Machines. The Details of the First of the Two Fixtures Used are Shown in Fig. 1; Those for the Second Fixture, in Fig. 5. The Parts are Shown in Figs. 2, 3, and 4. Two Additional Features are Suggested in Fig. 7

Fig. 2. The grooves are milled accurately in the face of the plate to a depth of $\frac{3}{32}$ in., and a width of .065 in., so as to accommodate the wire snugly, it being .063 in. in diameter. A bevel, G, of 5°, is milled on the corner, as shown. The plate is bored for three fillister-head machine screws, and hardened, to withstand the wear. In this, as well as in the other detail drawings, the dimensions are not given in great detail, as they would be of interest only in reproducing a set of parts for the making of the particular stopping lever described; essential dimensions for the application of the fixtures to other wire parts are given.

The supporting base A is shown in Fig. 3, in top and side views. It is of cast iron, milled to receive the plate B, and also to provide a shoulder on each side, for gripping the base in the vise, as shown in Fig. 6. The wiper C, which fits into the base, is shown in Fig. 4. It is of tool steel, hardened, and at its upper end is an anvil portion, which is forced against the wire in bending it. The anvil is not one-fourth of the area of the top of the wiper, but is $\frac{15}{32}$ in. in width on each side. This is to provide clearance, between the wiper and the edges against which it bends the wire, for the latter. Other parts, also shown in detail in Fig. 4, are the gauge D, of soft machine steel, casehardened; the gauge E, of tool steel, and the handle F. Two small pins are riveted into the lower surface of the gauge E, which fit into holes in the top of the plate B, so that the gauge will not shift when tightened into place by means of the machine screw.

The arrangement of parts and the details of fixture No. 2 and its fittings are shown in Fig. 5. The grooves V and W, and the clearance hole Y, are spaced in the forming plate H, to accommodate the partly formed wire in the third and sixth operations. The anvil L is similar to that used in the first fixture, and the rest J is provided for use in the third operation. Its upper surface is on a level with the bottom of the grooves, so that the wire placed in the grooves will rest squarely upon it, as indicated in the side view. It is shown in detail in the sketch below the top view. The rest K is a distinctive feature of this fixture. It is used in forming the wire to the 45° angle, in the third operation. It has a slanting side to conform to the 5° angle on the edge of the forming plate, and at the wedge-shaped end is a groove X. The detail drawing of this gauge is shown below the top view of Fig. 5.

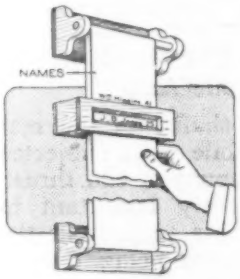
Two simple devices for use in connection with the forming fixtures described are shown in Fig. 7. The right-angle plate is used in bending wires to forms requiring only simple right-angular bends, and may be used to do preliminary work for the other fixtures, especially on rush jobs. The knurled thumbscrew M is set in the slot N so that the proper length of wire is bent, by forcing it against the side of the plate, as shown. The plate may be used separately or be fixed into a base with the wiper, as in Fig. 1.

If it is desired to use the fixtures described for bending angles other than right angles, a device for gauging the angle by one setting of a stop is convenient. Two stops, as shown at Z, Fig. 7, one right and one left, are required for the arrangement shown. The view at the left shows the fixture as seen from below, with the stop in place. The shoulder milled into the base, to provide a firm grip in the vise, is continued around the end of the base, forming a semicircular shoulder as a slide for the stop. The vertical edge of the shoulder is drilled and tapped to receive a round-head machine screw, by which the stop is fixed into place. If desired, indications of degrees may be made on the edge of the shoulder, to aid in setting the stop for the bending of various angles. The stop is made of soft steel, hardened, and is provided with a slot for finer adjustment, when the machine screw has been set into one of the holes in the shoulder. These simple additions to the fixtures will suggest other adaptations for use on particular jobs.

The considerations which resulted in the making of the fixtures described may be of interest in applying them to other work. The aim was to produce the special wire forms with the smallest possible expense, not only from the standpoint of labor cost, but also from that of cost of making the necessary tools. Hand-operated fixtures were determined upon, and it was decided that six operations were required for the job. The small size of the tools and fixtures, their comparatively small cost, and the fact that they are always ready for use without being specially set up, were points in their favor. Expert mechanics are not required to operate or set up the devices, and they can be operated successfully by unskilled labor with brief instruction.

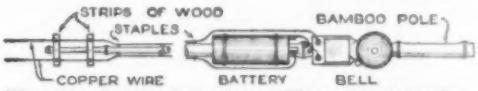
Device Facilitates Handling of Long List of Names

Frequent consultation of a long list of names made it necessary that some means be devised by which the list could be handled quickly; the device shown in the sketch was constructed for the purpose and proved satisfactory. Two rollers, with supports, were made to carry a long roll of finished-surface white cloth, on which the list of names was typewritten. A line guide was made to fit the roll of cloth, and mounted at a convenient point over it. By drawing on the roll the desired name is brought to the opening in the guide, and the user is enabled to obtain the name quickly and accurately. The device may be adapted to a wide range of uses, and paper strips may be used instead of cloth.



Electrical Finder for Submerged Metal Objects

Great difficulty is sometimes experienced in finding a gun, ax, or other heavy metal object, which has been lost in water. They sink into the soft mud, and diving fails to give any trace of them. The device shown in the sketch was made to locate such objects by the ringing of a bell when the electrical contact wires of the device are touched against the metal of the object sought. The device consists of a bamboo pole on which an ordinary doorbell with a dry battery is attached. Copper wires, stiff enough to stand the probing on the water bottom, are conducted from the battery and bell to the end of the pole. They are fixed to two strips of wood, which are pivoted on the pole. When the copper-wire points strike the surface of an irregular object they adjust themselves to the surface, by the movement of the pivoted wooden strips. Contact of both points with a metal object causes a current to pass and the bell rings, thus indicating the point at which the object sought is submerged.—W. S. Wilson, Cascades, Quebec, Can.



When the Points of the Copper Wires Touch the Submerged Metal Object Sought, the Bell Rings

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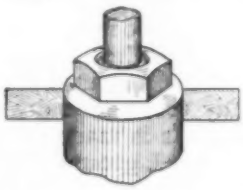
Ferrule for Tool Handle Made of Hose Coupling

The threaded section of a brass hose coupling makes a better ferrule for a heavy tool handle than the ordinary smooth-bore variety, since it can be tightened and will not slip off. It also gives a finished appearance to the handle, as the brass will keep polished with use. —James M. Kane, Doylestown, Pa.



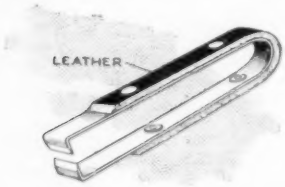
¶ Brass should be turned in a lathe at higher speed than iron or steel.

Enlarging a Pulley for Emergency Use

It was necessary to provide a 14-in. pulley on a shaft, and, in order to remove the 10-in. pulley at that point, it must either be broken or an entire line of shafting taken down to insert a new pulley. The engineer fitted the device shown in the sketch to the 10-in. pulley, making the outer rim 14 in. in diameter, as required. It was intended as an emergency method but has been in use several years. Wooden blocks were fitted around the pulley, and a split band clamped over them, screws holding the blocks fast to the band, as indicated at A. The band is tightened by means of the shoulders and bolts, at B, thus insuring a firm grip on the pulley, if attended to occasionally. Care must be taken in fitting the parts, and the pulley must not be used permanently under severe conditions.—James E. Noble, Toronto, Ont.

Nippers for Removing Insulation from Wire

Removing the cotton insulation from armature-coil leads, when connecting the coils to the commutator segments, is often a tiresome job. The accompanying sketch shows a handy tool which does the work very nicely. It is made of a piece of 1/16 by 3/4-in. steel, ground and tempered at the cutting edge. To protect the hand, a piece of leather can be cemented or riveted on, as shown. This tool is also convenient for use in removing insulation from various kinds of other electrical wire.—R. L. Hervey, Washington, D. C.

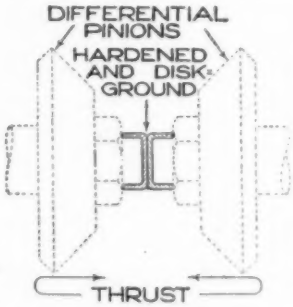


Noiseless Rubber Tips for Bench-Vise Handles

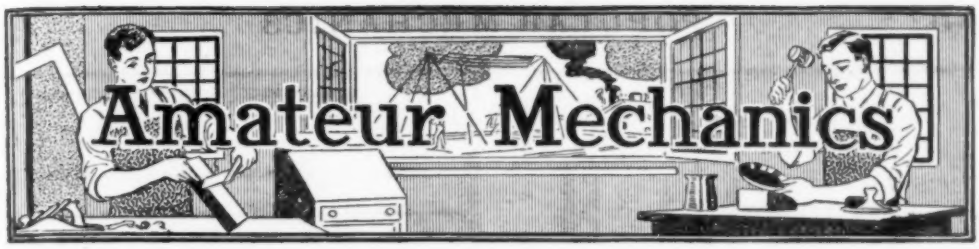
The wooden tips usually furnished with the handles of a bench vise do not last very long. For this reason they are sometimes replaced by iron tips or ferrules. These are noisy, make the handle heavy, and are likely to bruise a finger when the handle has been left raised and then slips. A better tip is made as follows: Cut two pieces, 2 in. long, from 3/4-in. garden hose, slip one over each end of the handle, and fasten them with three or four tacks each. Besides costing nothing and being easy to put on, these tips last for years and make the handle noiseless.—Henry Simon, Laguna Beach, Calif.

Eliminating End Thrust on a Rear Automobile Axle

The two drive shafts on the rear axle of an automobile were subjected to an excessive amount of end thrust, and it was extremely important to take up the looseness to prevent the differential gears from being thrown out of line, as this would cause serious trouble with the entire axle. It was decided to fit two hardened-steel end collars, as shown in the illustration, the clearance between the two not exceeding .01 in. The collars were pressed tightly on the ends of the shafts, then carefully hardened and ground on a disk grinder. The repair was so perfect that it was not necessary to replace the collars until the car had traveled over 4,000 miles.



¶A spark plug should not be turned firmly into a hot engine cylinder, as it will be difficult to remove it when the engine cools.



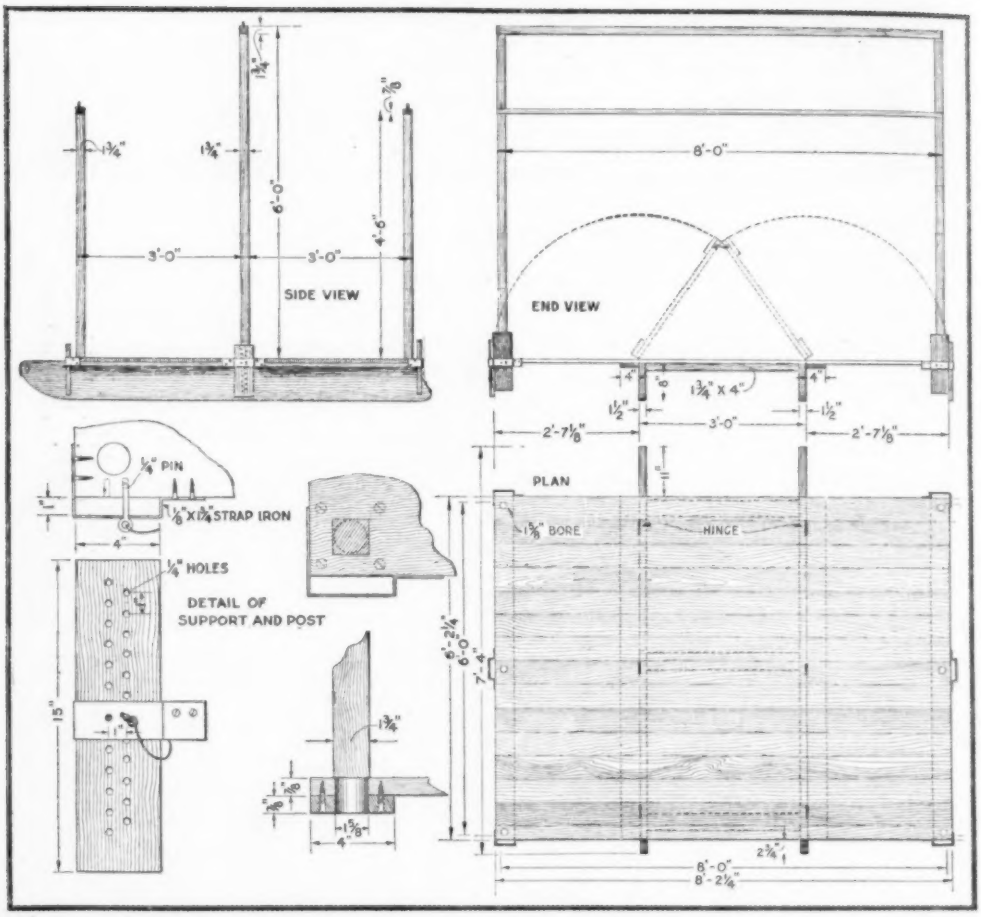
Portable Winter Shelter Tent Built on Sled

By D. J. HOUGH

AMONG the many uses to which a shelter tent may be put in winter, especially if it is portable, are the following: a headquarters for winter games, ice hockey, and skating; for winter tramping and short camping jaunts; for side trips by hunters; for ice fishing; and as a shelter for children, and their attendants, in the invigorating outdoor play. The shelter is shown set up and in use on the ice, in the background of the sketch. It is a simple form of canvas tent, the poles for which are mounted on a folding base. The view of the outfit folded and in transit shows the method of construction of the base and the sled runners. It is about 3 ft. wide and 7 ft. long when folded, and the poles, canvas, and other equipment are packed into the space between the folded sides. Unless loaded heavily with extra supplies or other articles, the sled can be drawn easily by two youths, and if a pony or a horse is available, longer jaunts may be undertaken. To set up the shelter, the side portions of the base are lowered, and wooden supports, shown in detail in the working drawings, are fixed into place, to insure a firm setting upon the ground. The supports are strips of wood 15 in. long, which are fitted into the metal hasps at the corners and on the sides of the folding sections, and set at the proper height by means of iron pins, inserted into holes in the hasps and supports.

The construction of the sled, the

This Portable Shelter Tent for Winter Use is Built on a Sled, and Is Adaptable as a Play Headquarters on the Ice, for Tramping, Short Jaunts, and Similar Purposes



The Base and Framework are Strongly Built, the Former Folding Up as Indicated by the Dotted Lines in the End View. A Detail of the Supports and the Post Fastening is Shown at the Left

base, the poles, and the smaller details is simple, and shown in the working drawings and the detail sketches of parts. A plan, end, and side views are shown; it should be noted that the ends of the tent are at the sides of the sections of the base, and that the ridge and side poles extend the length of the three sections. It is important, therefore, that the base be set level, by means of the six supports, or the weight of persons on it may cause damage to the poles. The sled is supported on two runners 1½ by 8 in., and 7 ft. 4 in. long. The ends of the runners are shaped as shown, and they are braced by three crosspieces of 1¾ by 4-in. stuff, housed flush into the upper edges. The side sections of the base, as well as the sled, are covered with ⅞-in. flooring, and the former are supported by cleats 4 in. wide and 6 ft. 2¼ in. long, nailed to the flooring. The side sections are hinged to the sled with strong butts, three being used on each side.

The vertical poles and the ridge pole are made of 1¾-in. square stock, cut to the lengths indicated in the side view, allowing enough more for the portion which fits into the socket at the base. The side poles are of ⅞ by 1¾-in. stock, and they, like the ridge pole, are fixed to the vertical poles by means of pins in the latter, which pass through holes in the ends of the horizontal

Small Snow Boats for Racing

Photographs of Guests Printed on

pieces. A detail of the method of fastening the vertical poles or posts into the base is shown at the left. The lower end of the post is cut to a shoulder and rounded off to fit into a 1⅝-in. round hole, bored through the flooring and cleat of the side section. Four screws are used to reinforce the cleats and flooring around each hole.

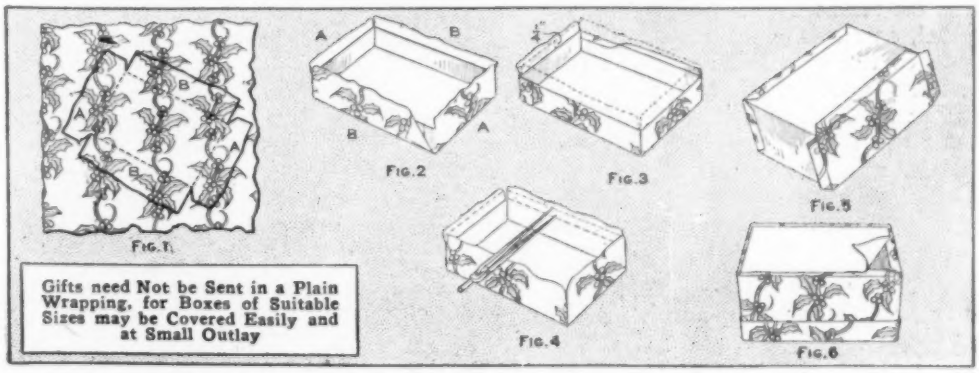
The construction of the supports is shown in detail at the left, and the other views show the places at which they are fastened. The supports are 1 by 4 by 15 in. and bored with two rows of holes, 1 in. between rows and between holes, the one row being set staggered with the other. The hasps are of ⅛ by 1¾-in. strap iron, and are shaped to fit the supports; the ends are fastened into the base with two screws at each. A ¼-in. pin, having an eye, is used to hold the support in place. The hasps for the side supports are fitted to provide a suitable socket for them, and are fastened to the edge of the section, as shown in the plan. The canvas cover should be made like an ordinary tent of this type, the framework being standard, to fit a tent 6 by 6 by 8 ft. in dimensions.

Covering Cardboard Gift Boxes

With a few simple materials and tools ordinary cardboard boxes may be covered and trimmed to make appropriate containers for use in sending small holiday gifts. Paper in holiday patterns may be purchased in rolls and sheets, or other ornamental paper may be substituted. The illustration shows a method of applying the covering paper to produce a neat finish.

Lay out a piece of paper, as shown in Fig. 1, arranging the designs so that they make a pretty spacing on the top of the box, or if the pattern is small, begin the cutting of the piece at the corner of the sheet. Allowance must be made for laps at the corners of the end flaps A, pasted down under the side flaps B, and the portion of the flaps to be pasted in at the top, as shown in Fig. 3. The fold at the top should be about ¼ in., and may be marked with a compass or dividers, as shown in Fig. 4.

The method of covering the lower part of the box, if it is one that has two sections, both of which are to be covered, is shown in Fig. 5. Cut pieces for each of the longer sides with flaps on all edges, and paste them into place. Then paste the end coverings into place, using two flaps, one at the top and one at the bottom. If the paper used is long enough to be cut economically, the covering for all of the sides may be cut in one long strip, with top and bottom flaps, and one flap at the point where the ends of the strip are joined. The bottom is covered by pasting a piece of white writing paper, cut 1/16 in. smaller all around than the bottom, as shown in Fig. 6. By saving boxes of various sizes suitable for the sending of gifts, and covering them, a considerable economy can be effected.

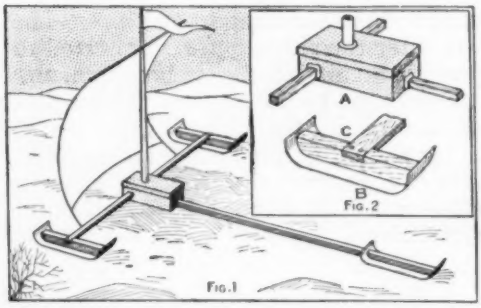


Gifts need Not be Sent in a Plain Wrapping, for Boxes of Suitable Sizes may be Covered Easily and at Small Outlay

HOW TO BUILD

Small Snow Boats for Racing Tournaments

On crisp winter days, when the snow is covered with a crust of ice, much



Small Craft to Sail on the Snow may be Made with a Framework of Light Sticks and a Cardboard Box to Support the Center Fastening

sport may be had with a fleet of snow boats, like that shown in the sketch. The craft are started across an expanse of snow by their owners, and not a little rivalry may be created, if a tournament is arranged. The boats are made of cardboard boxes, strips of wood, and light cloth, for sails. They may be from 1 to 3 ft. or more in length, the width being about two-thirds the length. The boat shown in Fig. 1 was made with a cardboard box as the support from which the various sticks of the framework are arranged. The box is 6 in. long, the crosspiece is 20 in., and the central rod 30 in. long. The mast and the sticks are each about ½ in. in diameter, and the mast is provided with a yardarm to support the square sail of thin cloth.

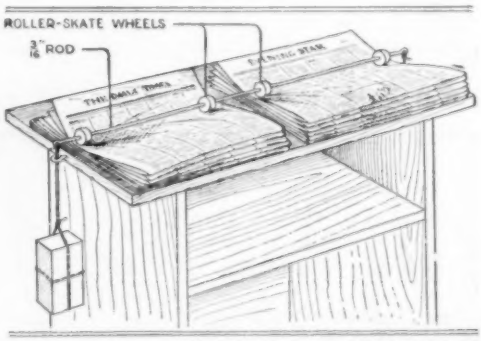
The ends of the framework are carried on runners made of tinned sheet metal, as shown in Fig. 2, at B. The ends of the crossbar are fitted to the wooden portion of the runners, as shown at C. The sticks of the framework are set into the box, braced together, and the openings around the sticks are filled with sealing wax, as shown at A. In larger types of these boats, which may be made of considerable size, the framework should be braced more strongly, and barrel staves may be used as runners.—J. G. Allshouse, Avonmore, Pa.

Photographs of Guests Printed on Place Cards

Amateur photographers may find not a little diversion in preparing novel place cards by printing small photographs of their guests on the cards. Such a novelty made a decided "hit" at a dinner party recently, particularly when the guests realized why their host had been so anxious to "snap" them shortly before the event. The gathering of the photographs, some of which showed guests in their earlier years and even as babies, created much interest. In several instances the procuring of the picture involved an interesting experience.

Weighted Rollers Hold Newspapers on Stand

In taking care of a news stand I found that bricks, horseshoes, or other weights to hold down the newspapers, were not satisfactory, so I made the device shown in the illustration out of four old roller-skate wheels, a piece of 3/16-in. rod, and bricks for weights. The rollers were slipped on the rod as shown and the weights were suspended on ropes from the end of the rod. To keep the rod from rolling, staples were fastened over the ropes at the end of the news stand. With this arrangement I can have a few or a big stack



The Roller Arrangement Enables Customers to Remove Newspapers Easily and Is Adaptable to Many or Few Papers

of papers on the stand and they will be held down firmly.—Frank Jablecnik, Chicago, Ill.

HOW TO BUILD A MOTOR ICE BOAT

By Charles H. Guthrie

TERRIFIC speed and the exhilaration of the out-of-doors in winter are fascinating elements of ice boating in its various forms, and particularly is this true of the sport when a strongly built motor ice boat is used. On very smooth, long stretches of ice, the speed is limited only by the power of the mechanism and the endurance of the driver. The possessor of such a mechanical craft will find much more satisfaction in it if he is both owner and builder. The boat described in this article and shown in use and constructional detail in the full-page illustration carries two passengers and the driver. It was built at comparatively small cost, many of the fittings being made from old or discarded parts of machinery obtained at small shops and garages. I used a 10-hp. two-cylinder, air-cooled gasoline motor, similar to those used on motorcycles; but, if the prospective builder cannot readily obtain such an engine, a small single-cylinder engine of at least 4 hp. will serve the purpose. The ice boat complete weighs 275 pounds.

The working parts and control mechanism are carried on a strong wooden frame, mounted on three iron-shod runners, the rear runner being controlled by a steering wheel, to direct the course of the craft. The engine is mounted on the forward end of the frame, as shown in the illustration, with the gasoline tank above it. Below the tank, and adjoining its support, is the tool chest and battery box. The engine is geared to the driving wheel, the rim of which is provided with spikes that grip the ice in propelling the machine. I used a rear wheel of a motorcycle, complete with brake and axle, for the driving wheel, and fitted a driving chain to the gears. The gear ratio was rather low, 4½ to 1, between the engine and wheel.

The woods used in the construction were selected for their special fitness: spruce, for lightness and strength; cypress, for lightness and durability; and oak or hickory, for great strength. Bolts and screws should be used in preference to nails wherever possible in the construction; washers should be provided for bolts, and second, or jam, nuts should be used on bolts, to insure rigidity.

Time and expense will be saved by procuring all of the necessary materials before beginning the actual work of building. The complete list of materials follows:

1 motorcycle or cyclecar engine, from 4 to 10 hp., with ignition system, oiling system, and gasoline tank.
1 motorcycle rear wheel, with brake and chain.
1 automobile steering wheel.
1 chain to wrap around rim of driving wheel for use on snow.
1 ball bearing with race to fit 1-in. shaft.
1 electric switch with screws.
24 ft. 4 in. iron band, 1½ by ¼ in.
8 ft. band iron, 1¼ by ⅛ in.
2 ft. round iron rod, ½ in.
1 ft. 8 in. round iron rod, 1 in.
2 ft. 6 in. iron band, 2 by ¼ in.
8 ft. No. 12 gauge wire.
8 ft. electric-light cord to connect ignition apparatus with switch on dash.
6 ft. stovepipe wire.
16 bolts and washers, 5½ by ½ in.
20 stove bolts, 3 by ¼ in.
3 stove bolts, ¾ by ¼ in.
3 rivets, 3 in.
1 bolt, 1 by ¼ in.
2 bolts, 1 by ½ in.
90 spikes, 4¼ in.
1 cotter pin, ¼ in., with washer for 1-in. shaft.
4 ft. cypress, 1 by 12 in.
2 ft. cypress, 1 by 14 in.
8 ft. cypress, 2 by 12 in.
24 ft. spruce, 2 by 4 in.
4 ft. oak or hickory, 1 by 12 in.
3 ft. oak or hickory, 1 by 2½ in.
4 ft. cypress, ¼ by 12 in.
1 wooden box, about 9 by 9 by 18 in., for batteries and tools.

The construction may begin properly with the runners and the framework, shown in detail in Figs. 1, 2, and 3. The pieces of stock from which the wooden parts are cut are those listed in the bill of materials. To make the runners, mark off, on the 8-ft. piece

of 2 by 12-in. cypress, 30 in., 30 in., and 23 in., allowing 1/4 in. for sawing and planing; then with the compass scribe an arc, 6 3/4-in. radius, as shown at A, Fig. 1, from a point 9 in. from the forward end of the runners. Cut the rear runner down to its height of 10 1/2 in., and plane the edges of the runners straight and smooth.

Cut two stringers, B, of 2 by 4-in. spruce, 9 ft. long, and two braces, 20 in. long. Join the pieces of the frame with screws or spikes, taking care that the forward brace is 11 in. from the end, that the rear brace is flush with the ends of the stringers, and the corners are square. The front board C, of cypress, 1 by 12 in. by 4 ft., is housed into the upper edges of the front runners and fastened in place with screws. The joint of the front piece and runners is further reinforced by 2 by 4-in. braces, D. Drill the front ends of the stringers for bolts, spacing them as shown in Fig. 2. House two pieces of oak, or hickory, E, 1 by 12 in. by 2 ft., into the stringers 10 in. from the rear end, and bolt them with four 1/2-in. bolts. In the center of these oak pieces, 16 in. from the rear end of the frame, bore a 1-in. hole, for the steering post.

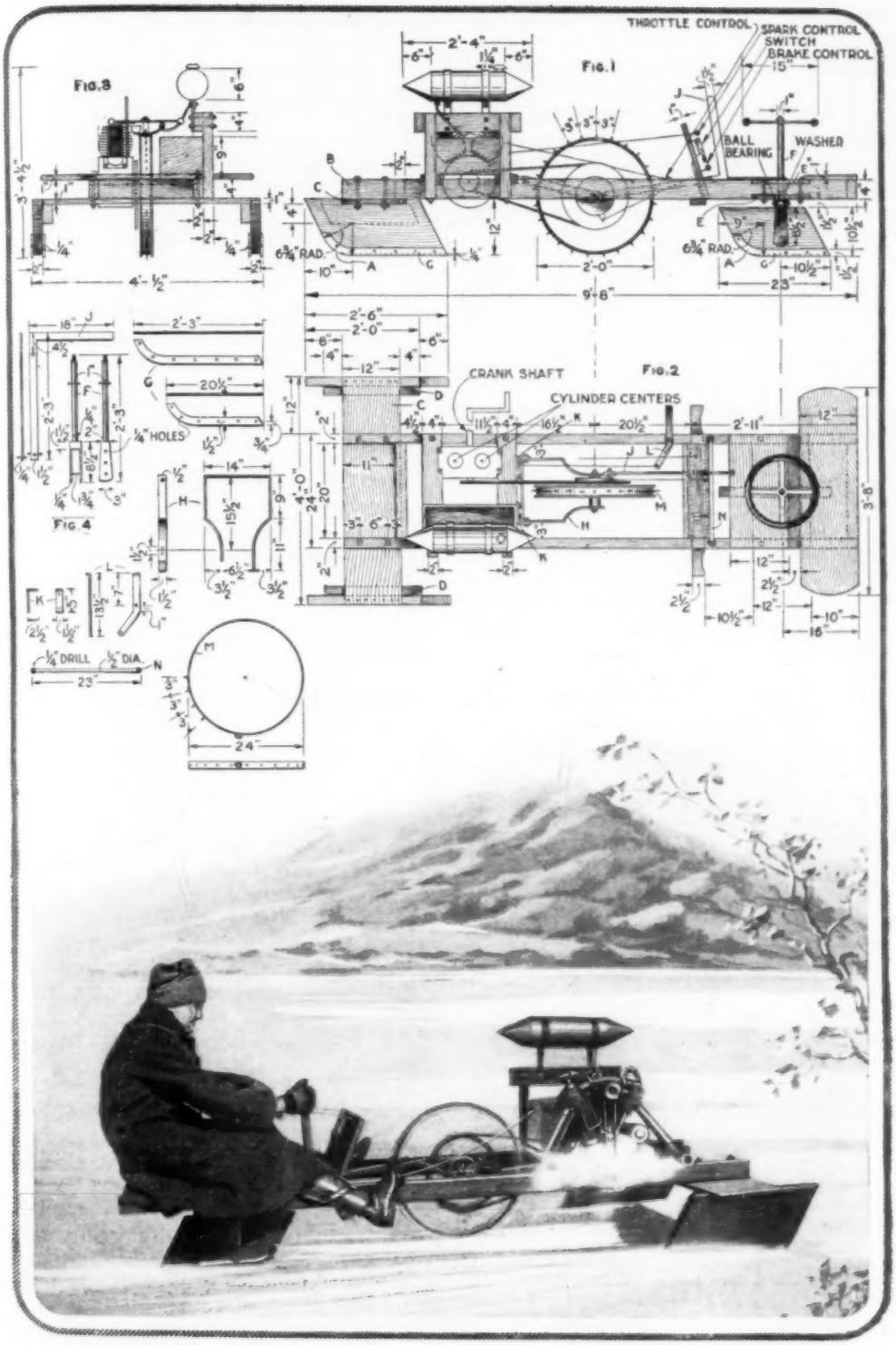
The steering post F should then be made, the details of which are shown in Figs. 1 and 4. It is 27 in. long over all, and made of a piece of 1-in. round iron, fixed to a U-shaped fork, which is riveted to the rear runner. The lower part is made from a strip of iron, 1/4 in. by 2 in., and is welded to the lower end of the rod. The upper end of the rod is turned to a shoulder in a lathe, to fit the steering wheel, and provided with a keyway and threaded end to fit a 3/4-in. nut, which holds the wheel in place. Drill three 1/4-in. holes in each side of the fork to receive rivets or bolts. Countersink the sides of the fork 1/8 in. into each side of the runner, and rivet them in place. Set the ball bearing on the shoulder of the fork and fit the shaft into the center hole in the oak boards E, placing a washer on the upper surface of the lower board. Mark the shaft at this point and drill it for a 1/4-in. cotter pin, reassemble the parts, inserting the cotter pin. Nail the 1/4-in. cypress boards over the frame in front of and around the steering rod, providing a hole for the latter. The seat may be made and fitted in place later.

The main framework is now complete, and the runners may be shod with iron strips, shown in detail in Fig. 4, at G. Two strips are required for each runner, and they are drilled for 3/16-in. bolts. The bottoms of the runners are planed off 1/4 in., permitting the strips to make a good contact with the ice, as shown in Fig. 1, for purposes of speed and the prevention of skidding. The use of bolts makes it easy to remove the strips for sharpening.

The supports for the engine and other equipment should then be fixed into place, as shown in Fig. 2. They are 24 in. long, of 2 by 4-in. stock, and set one-half their thickness into the stringers. A 1/4-in. bolt, reinforced by a spike at each side, holds their ends.

The bracket H, Fig. 4, which is to hold the driving wheel, as shown in Fig. 2, must be made carefully and strongly enough to carry the strain. It is made of a strip of 1/4 by 1 1/2-in. iron, heated and bent to the shape shown. One end is longer than the other, to provide a joint for the lever J, Figs. 2 and 3. A slot, 1 1/2 in. long, is made in both sides of the bracket, 15 1/2 in. from the square end to the center of the slot, for adjusting the driving wheel to the chain. The slot should be made of a width suited to the particular axle used on the wheel, hence no size is given for it. The surface of the bracket surrounding the slots on the outside should be roughened with a center punch so that the nuts holding the axle will grip firmly.

The alining of the bracket is important, and should be done as follows: Stretch a cord from the center of the steering rod, which should be exactly over the center of the rear runner, to the center of the forward brace. Adjust the bracket so that the center of the wheel will be directly below the cord, and so that the axle will be horizontal,



This Motor Ice Boat was Designed to be Made in the Small Workshop with a Minimum Outlay, Using Materials Readily Obtainable at Local Shops and Garages. With Its 10-Horsepower Motor, It has Developed Great Speed and has Stood Hard Service

thus insuring that the wheel will run true, if it is not warped. The forward end of the bracket is mounted to pivot on bolts set through two strap-iron angles, K, shown in Fig. 2, and in detail in Fig. 4. The lever J, which is used to raise and lower the wheel for contact with the ice, is shown in detail in Fig. 4. It is pivoted on the longer side of the bracket, as shown in Fig. 2, and also on an iron rod, N, which extends across the frame in front of the driver.

The rim of the motorcycle wheel was fitted closely with a band of 1/8 by 1 1/4-in. band iron, bolted together at a shoulder joint, as shown at M, Fig. 4. Holes were drilled through the band at intervals of 3 in. Spikes, about 3/16 in. thick and 1 in. long, may be riveted to the band, but an easier method is to fit flat-head wood screws in the holes, wrapping a piece of twine around each of the screws to prevent them from slipping out while the band is being fastened in place. A hole should be drilled through the band so that a bolt may be put through it and into the tire-valve hole, to keep the band from slipping, although the grip on the wheel should be firm without this reinforcement. Other methods of fitting the band to the wheel will suggest themselves, and if a wider band is used, the spikes may be set in two rows and staggered, to give better traction on the ice.

The support for the gasoline tank is made of two uprights of 2 by 2-in. stock, and a crosspiece of 2 by 4-in. stuff, to which the 1/8 by 1 1/4-in. metal strips holding the tank are bolted. The support should be made high enough to bring the tank well above the engine. That shown in the illustration is about 2 ft. above the top of the stringers, at the filling cover. The battery box below the gasoline tank was combined with the tool chest, a partition separating the tools and batteries. The box used is 9 by 9 by 18 in. in size. If other types of ignition are used suitable containers may be made readily.

The engine is mounted on the two 2 by 4-in. braces provided for it. A good method is to aline the wheel completely and to make the engine conform to it, rather than to attempt a readjustment between them. A means of clamping the particular engine support to the frame must be devised. Pipes may be used to advantage in some instances where a motorcycle engine is fitted with substantial clamps suitable for fastening to them. If the engine is provided with lugs they may be bolted directly to the braces, with such additional blocks as may be needed. Iron plates, 4 in. wide and of suitable length, should be placed on the braces to prevent them from splitting from the vibration, at the points where the engine is bolted.

Some motorcycle engines have "kick" starters, and others are started by means of pedals. A cranking device with a removable crank like that used on automobiles, and fitted so that it will be quickly released when the engine starts or "kicks back" may be made. My engine cranks on the side, as suggested in Fig. 2.

The gasoline tank is of the double-point variety used on racing motorcycles. The oiling system and gasoline tank of many motorcycles are built into the same container. If one of this type is not available, an oiling system may be made, like mine, from brass tubing and a quart fruit can. If the engine is of the water-cooled marine type, a water tank may be made from a 5-gal. can, and the cold air and the speed will keep it from becoming heated.

An accelerator to be operated by the right foot was fitted to the engine. The lever L, shown in detail in Fig. 4, was connected to the carburetor by a fine steel wire, and a spring was placed back of the throttle to keep it closed. A heavy No. 12 gauge wire was used to advance or retard the spark, and a knob was placed on the end of the wire, Fig. 1. The brake of the wheel was connected with a No. 12 wire and a knob was fitted to the latter. By this means the wheel is stopped quickly after the ignition switch has been opened, and when the wheel is engaged

in the ice, the machine may also be brought to a stop readily.

The dashboard, a piece of wood, 1 by 14 by 20 in., should then be fitted into place. A switch was placed on it, within easy reach, to cut off the ignition in emergencies and for slowing down. The holes and slots for the lever and wires are cut through the dashboard, which may be reinforced on the lower side with small metal strips, to prevent it from splitting. The 1 by 3 in. by 3-ft. piece of oak is used for foot supports, each end being rounded out to fit the shoe. The handles of the controlling levers and wires should be wrapped with tape to insure a firm grip. The rear seat may then be fastened into place.

The machine is then ready for a test, with the driving wheel raised at first until the driver has learned to handle the controls properly. For use on snow I remove the spiked band and place a chain around the rim of the wheel. On either ice or snow the depth of the driving wheel in the snow or the spikes in the surface of the ice is regulated by pressure on the lever J, and the wheel may be raised clear of the surface by the same means. The deeper the grip, up to a certain limit, the greater the speed that is possible.

By placing my legs on one side of the steering rod, instead of on the foot rests, with a passenger sitting on each side, I was able to carry three persons on the rear seat. A fourth person may sometimes take the rather hazardous though exciting seat in front of the engine when the path is clear, and the speed traveled is moderate.

Miniature Locomotive and Cars Made by Boy

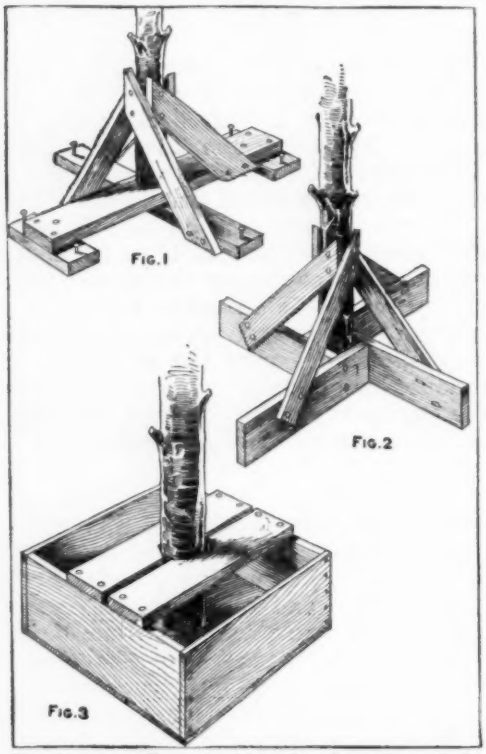
The engineer on "Engine 40" was a friend of the 11-year-old boy who made the locomotive and train of cars shown in the illustration, out of bits of wood and other material gathered about the home and elsewhere. The friendly engineer explained the parts of the locomotive to him, enabling the boy to learn the details of construction. The boiler of the engine was made from a stick of cordwood, whittled down to the proper shape after hours of work. The parts of the engine, including the throttle, reverse lever, sand lever, ash shaker, and whistle cord, were made from baling wire. Spools of various sizes were used to make the small wheels and the drivers. The smokestack, sand chest, and whistle dome were whittled from pieces of pine. The tender has coal and water compartments. The bodies of the cars were made from wood obtained from old boxes. The running boards, ladders, brakes, and other details, were fitted on the cars, which include box, gondola, and flat cars, and a caboose. The ladders, couplers, trucks, and chains were also made from wire. The train was painted, the engine being black, and the cars red with white lettering. The train shown in the photograph reproduced is 6 ft. long.—Herbert C. Crocker, Edwardsville, Ill.

Setting the Christmas Tree in a Substantial Base

The bringing home and the trimming of the Christmas tree are among the greatest joys of Christmastide, but setting the tree so it will not fall over is usually a prosaic process. While a small tree may be set by standing it in a pail and filling around it with stones,

This Miniature Locomotive and Train of Cars, Quite Complete in Detail, was Made by an 11-Year-Old Boy

a larger one needs a broader base to insure reasonable stability. Three simple methods of setting a tree, neither of which requires more tools



The Christmas Tree should be Set Securely, and the Methods Shown Are Practical

than a hammer and saw, and a few nails, are shown in the illustration.

To make the stand shown in Fig. 1, eight pieces of wood are necessary: two pieces, about ¾ in. thick, 4 in. wide, and 3 ft. 6 in. long, for the crosspieces; two pieces, 8 in. long, for the feet, and the braces, which should be from 12 to 20 in. long, depending upon the size of the tree. The crosspieces are fastened together and the tree braced with four-penny or six-penny common nails.

If the butt of the tree is less than 2 in. in diameter, a 1-in. hole may be bored in the center of the crosspieces and the butt trimmed down to fit it, but a larger tree should be fastened by nails driven slantingly through its butt into the base.

Another method is shown in Fig. 2. This requires four pieces, about 2 ft. long, which should be nailed together whirligig-fashion to form a square hole in the center large enough to receive the butt of the tree, after which braces should be nailed into place to hold it upright.

In setting a small tree as shown in Fig. 3, a box of convenient size may be used. The inside of the bottom of the box should be nailed to the squared butt of the tree, and the box and tree lifted into position. The supporting strips should be prepared by cutting them somewhat longer than the width of the box, and making a triangular notch in the middle of one edge of each of them; these notches should be placed against the tree trunk and the strips fastened with nails to the edges of the box, so that the tree will be held in a vertical position. The ends are then sawed off.

The bases shown in Figs. 1 and 2 are large enough for trees less than 10 ft. in height, but trees of any size may be set by the same methods if the bases are correspondingly stronger. If it is permissible, stability may be insured by nails driven into the floor, as indicated in Fig. 1. These should not be driven in so far that they cannot be pulled out easily with a claw hammer. —C. A. King, East Kingston, New Hampshire.

Blotting Ball for Cleaning Water-Color Brush

Having considerable water-color drawing to do, and finding that it was difficult to keep the brushes clean when several colors were applied with the same ones, I made a blotting ball for the purpose. This consists of a ball of crushed blotters sewed up in a layer of cheesecloth. The brushes are touched on the ball and the color in them is quickly absorbed without leaving any lint on the brush.—Charles Kasnicka, Chicago, Ill.

¶ Flour paste will adhere better and not sour quickly if a small quantity of borax is added.

Decorative Toys and Boxes Made at Home

By Bonnie E. Snow

HOMEMADE toys and gifts, as well as the "treasure boxes" in which they are contained, have an added interest both to the one making and the one receiving them. The holiday season makes this work especially attractive, which affords opportunity for individuality in construction and design limited only by the skill of the worker. The decorated toys and the box described in detail in this article are suggestive only, and may be adapted to a large variety of forms and designs. The gorgeously colored parrot and the gayly caparisoned rider and horse suggest a host of bird and animal forms, those having possibilities for attractive coloring being most desirable. The decorated box shown in Fig. 7 may be adapted as a gift box, to be used where its decoration may be seen, in the nursery, for example, and may be made in many forms, in fact as various as cardboard boxes are. Plant, animal, or geometrical forms may be used to work out designs, and appropriate color schemes applied to them. A good plan in determining upon a color scheme is to use the colors of the flower or other motif. If the design is not associated with objects having varied colors—a geometrical design, for instance—harmonious colors should be chosen. These may be bright and contrasting, as red and green, violet and orange, or subdued in tone.

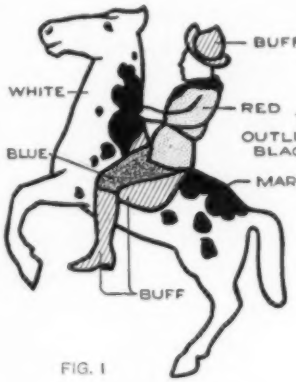


FIG. 1

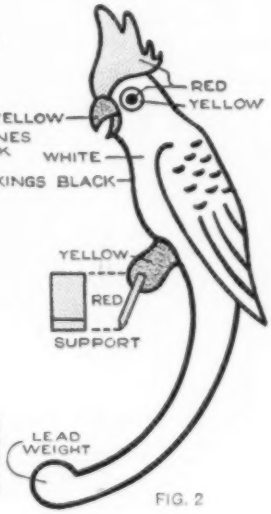


FIG. 2

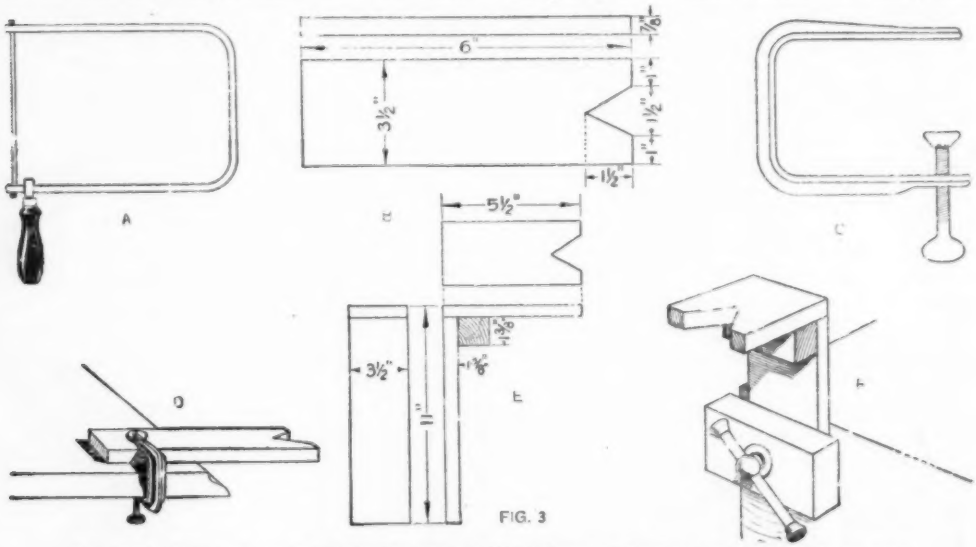
The Outlines for the Horse and Rider and the Parrot may be Made by Enlarging These Sketches. The Color Scheme Indicated Is Suggestive Only and may be Varied to Suit Individual Taste

A design for a horse and rider, brightly colored, is shown in Fig. 1. The form is cut out of thin wood, the color applied, and the figure mounted on the curved wire, weighted at one end, as shown in Fig. 6. The toy adds a touch of color and novelty to a room, when suspended from the corner of the mantel, from a shelf, or other suitable place. Balanced in a striking attitude, forefeet upraised, even grown-ups can hardly resist tipping the rider to see his mount rear still higher. The parrot shown in Fig. 2 is made similarly, and is weighted at the end of the tail. The point of balance is at the feet, which may be fastened to a trapeze, or be arranged to perch on a convenient place, like that suited to the horse and rider.

The tools and equipment necessary for the making of such toys are simple, and available in most boys' workshops or tool chests. A coping saw, like that shown at A, Fig. 3, is suitable for cut-

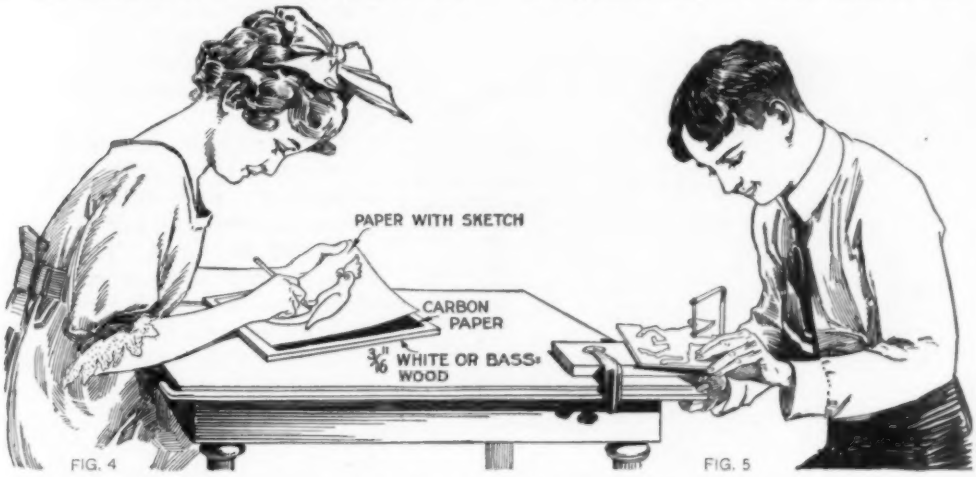
ting the wood. A fretsaw, operated by hand, foot or power, may be used, and such a tool makes this work quite rapid. To use the coping saw to the best advantage, particularly if the work is to be done on a table which must not be marred, a sawing board should be made. In its simplest form, this consists of a board, as shown at B, about ⅞ in. thick, 3½ in. wide, and 6 in. long, with one end notched. This is clamped to the end of the table, as at D, with a clamp, an iron one of the type shown at C being satisfactory. Another form of sawing table especially useful when it is desired to stand up at the work, is shown at E in detail and clamped in the vise at F. It consists of a notched board, 3½ in. wide, fixed at right angles to a board of similar width, 11 in. long, and braced at the joint with a block about 1⅜ in. square. In using the coping saw with either of these saw tables, the wood is held down on the support, as shown in Fig. 5, and the saw drawn downward for each cutting stroke, thus tending to hold the board more firmly against the saw table. It is, of course, important that the saw be inserted in the coping-saw frame with the teeth pointing toward the handle, so that the method of cutting described may be followed. The wood must be sawed slowly, especially at the beginning of a cut. The operator soon learns the kinks in handling the saw and wood to the best advantage, and can then make rapid progress.

An outline drawing of the form to be cut out of the wood must first be made, to the exact size that the object is to be. There is much satisfaction in working out the form of the animal or other figure, especially for the boy or girl who has the time necessary to do good work. If desired, the figure may be traced from a picture obtained from a book, magazine, or other source. Cut a piece of wood to the size required for the design, and place a sheet of carbon paper over it; or if none is available, rub a sheet of paper with a soft pencil, and use this as a carbon paper, the side covered with the lead being placed next to the wood. The carbon paper and the sheet bearing the design should then be held in place on the wood with thumb tacks, or pins, and the transfer made with a pencil, as shown in Fig. 4. The design should be placed on the wood so that the weaker parts, such as the legs of the horse, will extend with the length instead of across the grain of the wood.



The Tools Required are Found in Most Boys' Workshops, and a Satisfactory Saw Table may be Made Easily, as Shown in Detail

In some instances, where a complicated form is cut out, it is necessary to use wood of several plies, and where



The Design is Traced Carefully onto the Wood and Then Cut Out with the Coping Saw, on the Saw Table

this is available it is worth while to use it for all of this work. For smaller objects wood 3/16 in. thick is suitable, and stock up to ½ in. in thickness may be used. Whitewood, basswood, poplar and other soft, smooth-grained woods are suitable.

When the design has been outlined satisfactorily, place the piece of wood on the saw table with the design on the upper side. Holding the wood down firmly, as shown in Fig. 5, and sawing in the notch of the saw table, cut into the edge slowly. Apply light pressure on the downstroke only, as the upstroke is not intended to cut, and turn the piece to keep the saw on the line and in the notch. It is important that the saw be held vertically so that the edge of the cut-out portion will be square. With proper care and a little practice, the edges may be cut so smoothly that only a light sandpapering will be required to produce a smooth edge. When the figure has been cut out, smooth the edges by trimming them carefully with a sharp knife, if necessary, and sandpaper them lightly to remove sharp corners. A fine sandpaper, about No. ½, is suitable for this purpose. The figure is then ready for painting. The white is put on first and the other colors applied over it, when dry.

Oil paints may be used, and a varnish or shellac applied over them to give a high grade of work, but this process requires much care, considerable skill, and long drying between coats to prevent "runs" in the colors.

Water-color paint, which can be purchased in powder form at paint stores, mixed with water to the consistency of cream, is a satisfactory coloring material, and is easy to apply. Five cents' worth of each of the colors used—yellow, red, blue, black, and white—will be sufficient for several toys. Mix each color in a separate saucer, and use a small water-color brush to apply the paint. In painting the horse and

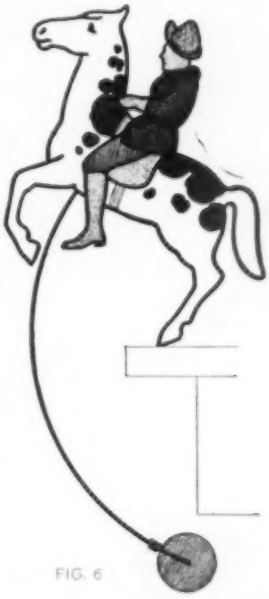
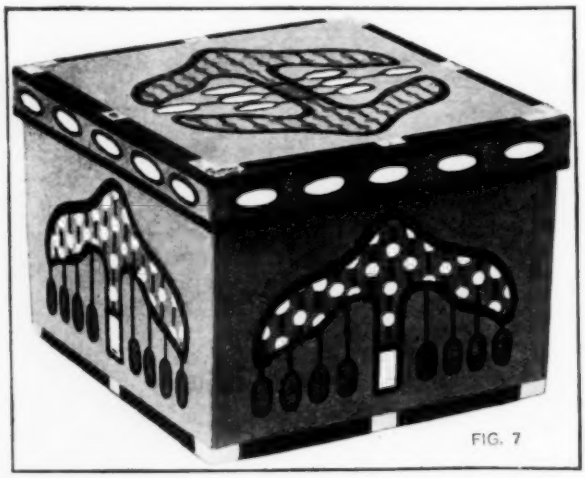


FIG. 6

rider, the horse is first painted entirely white, and then the black spots are applied after the color is dry. The rider's coat is painted red; the trousers blue; the hat and leggings buff, as indicated in Fig. 1. Mix a brushful of yellow with a brushful of red, and add about three brushfuls of white. A half brushful of black may be added to dull the color, if desired. The flesh tone for the rider's face is made by mixing a little red with white. When the colors are dry, all edges are outlined with a heavy line of black, not less than 1/8 in. in width. This outline may be evenly applied with the point of the brush.



A Handmade Box Is Interesting in that It Expresses the Individuality of the Maker, Especially When Made as a Gift

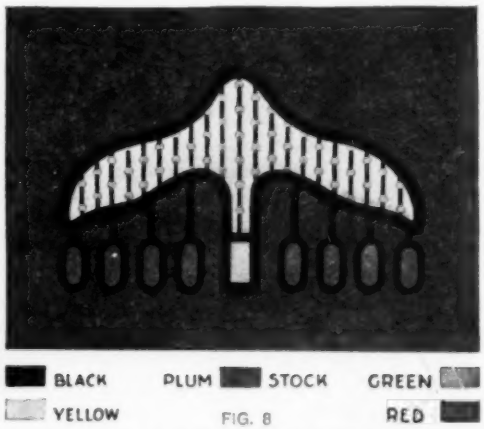
The method of making the parrot is similar to that described for the horse and rider, and the color scheme is suggested in Fig. 2.

It will be noticed that no attempt is made to secure a lifelike, or realistic, effect in painting these toy shapes. All colors are flat, that is, without light and shade. The toys are really decorative designs, and the maker is at liberty to use any colors desired, whether natural or not.

The horse and rider is balanced on the hind foot, as shown in Fig. 6, by using a lead weight, attached to a 1/16-in. wire, as a counterweight. The wire should be set into the body of the horse, behind the foreleg, to a depth of 3/4 in. The weight of the metal and the curve of the wire should be adjusted to obtain the proper balance. The parrot is balanced in the same way, except that the weight is fixed to the end of the tail, which is curved like the wire.

These and other homemade toys or gifts may be sent or contained appropriately in boxes decorated to match them, as shown in Fig. 7. They may be made complete, or commercial boxes of suitable sizes may be covered and decorated. If good materials are used, such a box makes a pretty and useful gift in itself. The complete process of making a typical box is described for those who prefer to make one of special size. The dimensions given are thus only suggestive, and may be adapted to suit particular needs.

The materials necessary are: cardboard, cover paper, lining paper, bond paper, paste, and water colors. The latter should be of the opaque variety, since white or other light shades may then be used on darker-colored paper.

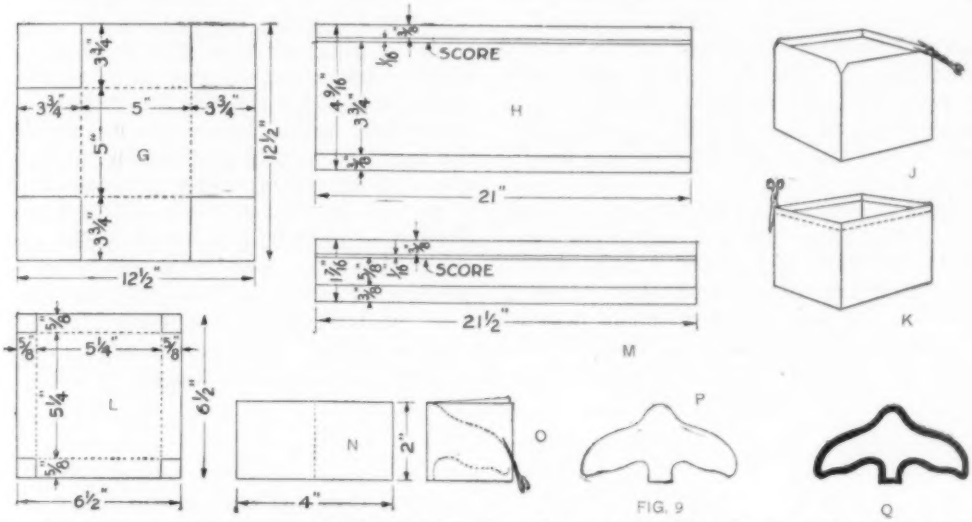


Color Schemes may be Obtained from Flowers and Other Natural Forms, or by Selecting a Combination of Harmonious Shades. The Background Is of Plum-Colored Paper; the Small Circles are Emerald-Green; the Light Area, Yellow, and the Ovals, Orange-Red

A sharp knife, a scissors, a metal-edge ruler, and bookbinder's paste are also needed. Suitable substitutes for the

various kinds of paper may usually be obtained in the home, if they are not readily available at local stationery stores or printing establishments.

from the long edges, and then spread a thin layer of paste over the outer surface of one of the sides of the box. Apply the paper to the pasted surface



The Various Steps in the Process of Making and Covering a Rectangular Cardboard Box are Shown in Detail. The Method of Making a Pattern for the Design is Shown Below

The box is made as follows: Determine upon the proper size and select materials to carry out the design. An appropriate combination of colors and materials is suggested in Fig. 8. Cut out a square of the cardboard, having sides 12½ in. long, as shown in Fig. 9, at G, then mark it as indicated and cut on the full line to remove the square corners. Crease it on the dotted lines and fold to form a box. To hold the cardboard in box shape, strips of bond paper—ordinary writing paper—are cut, 3¾ in. long and 1 in. wide, then creased along their centers and pasted to the corners. The paste should be applied to the paper strip first, then on the corners of the box. Apply the piece of paper over the corner of the box on the outside, pressing it to make a snug fit. Repeat this operation on the other corners.

Lay off the dimensions given at H on the selected color of cover paper, which in this instance is plum, and score the lines indicated. Spread paste smoothly over the surface of the plum paper, between the lines drawn ⅜ in.

and press it down, rubbing gently out from the center to remove air bubbles. Fold the ⅜-in. laps at the top and bottom over the upper edge of the box and around the lower corner. Repeat this process, covering the four sides. To form a smooth fold at the corners, it is best to miter the paper as shown at J and K, before pasting it down. Then paste a square of the same paper 4⅞ in. wide on the bottom of the box, taking care to match the edges evenly all around.

Line the box with a strip of lining paper, 20 in. long and 4 in. wide. Try the lining by folding it into the box so that its upper edge is about ⅛ in. from the edge of the box, and crease it carefully into the corners. Remove it, apply paste, and press it well into the corners when pasting it down. Paste a square of the same paper, 4⅞ in. wide, in the bottom of the box.

The cover is made by the same process as the main portion of the box. The dimensions of the cardboard are shown at L, and the covering at M. It should be observed that the cover is slightly

wider than the box, so that it will fit easily.

When the box is thoroughly dry, it is ready to receive the decorations on the top and sides. The design may be adapted from a leaf, flower, or similar form, as well as from geometric or animal forms. The horse and rider, the parrot, and the animals shown in the headpiece of this article are all suggestive of animal forms that are available.

The design shown on the box in Fig. 7 was adapted from a flower form, two of the units being joined for the decoration on the top. To obtain a pattern for the design, fold a piece of paper, 2 by 4 in., as shown at N, and outline one-half of a leaf, flower or similar motif. Cut the folded paper as at O, and a pattern similar to that shown at P results. Trace around this to place the figure on the box. Outline the figure with black, about ⅛ in. wide, as at Q. The oval figures, suggestive of small pods on a flower, are also outlined in black, and joined to the main portion of the design by a black line. Thinner black lines are drawn vertically across the form, and small circles placed along them at intervals. The color scheme is shown in Fig. 8. The light background is yellow, the small circles are emerald-green, and the ovals red-orange. The rim of the cover is decorated with a border of white ovals, outlined in black. The corners are banded in black and white as shown in Fig. 7.

Care and Storage of Camp Equipment

A slovenly sportsman misses much of the joy of the man who takes pride in giving his outfit the proper care, not only during its period of use, but also during the winter, when occasional overhauling serves to keep one in touch with sports of other seasons. And a very real joy it is, each article recalling an experience as one examines it minutely for a possible rust spot, scratch, or injury.

Tents usually come in for much abuse, which shortens their life considerably. Cotton duck molds quickly, and rots if left rolled up damp. Care should be taken, therefore, to insure its perfect dryness before storing. Silk and silk-composition tents, being thoroughly waterproof, are almost as dry after a rain or dew as before, so may be packed for moving at any time. But all tents and tarpaulins should be washed and dried carefully after the season's use.

Blankets absorb much moisture, and should be shaken and spread out over bushes to dry in the sun, at least once a week. In the cold nights of late summer, the increased warmth of blankets after drying is considerable.

Pack straps and ropes should not be left exposed to the weather. They speedily become hard or brittle; squirrels like the salt they can obtain by chewing the leather, and if left on the ground in a rabbit country, the straps are soon cut into bits. Hang the leather goods in the peak of the tent, keep them away from fire, and oil them occasionally.

A canoe should not be left in the water overnight, or at any time when it is not in use. Simply because use makes it wet, a canoe should not be left so any more than a gun should be left dirty, or an ax dull. If on a cruise with a heavy load, pile the stuff on shore at the night camp, and turn the canoe over it. If a canoe is permitted to remain in the water unnecessarily, or its inside exposed to rain, it soon becomes water-soaked and heavy for portage, besides drying out when exposed to the sun, and developing leaks.

Small punctures in the bottom of a canoe may be mended with spruce, tamarack, or pine gum, melted into place with a glowing firebrand, held close, while blowing at the spot to be repaired. Torn rags of canvas-covered bottoms may be glued with the softer gum of new "blazes," gathered with a knife or flat stick.

While traveling on shallow streams, the bottom of a board canoe develops a "fur" of rubbed-up shreds. Every

night these should be cut short with a sharp-pointed knife, to prevent a shred from pulling out and developing into a large splinter. The paddles, and the setting pole, unless shod with iron, become burred at the ends and require trimming down to solid wood.

The track line, if in use, is wet most of the time, and unless dried frequently, becomes rotten. Every tracker knows the grave danger with a rotten line in a rapids.

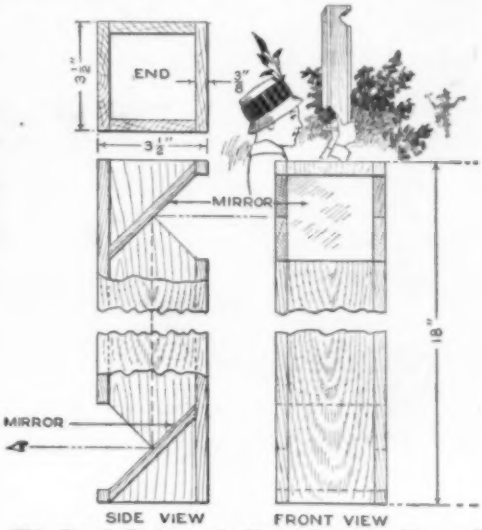
During the winter the canoe should be scraped and sandpapered, bulges nailed down, permanent repairs made to the covering, and the canoe painted on the exterior and varnished on the interior.

The average fisherman is an enthusiast who needs no urging in the matter of caring for his outfit, and the user of firearms should profit by this example. Even if not a shot has been fired from a gun all day, moisture from the hands, or from the dampness in the woods, or marshes, may cause rust spots, or corrode the bore. Rub an oily rag through the bore and over the outside of the gun every evening, before laying it aside.

Cleaning rods are safer and more thorough in cleaning the bore than the common mouse string, which may break when drawing a heavy piece of cloth through, causing much difficulty. A wooden rod, preferably of hickory, is best, although the metal rod is stronger for use in small bores, but care must be taken not to wear the muzzle unduly. The hunting weapons should be carefully overhauled before storing them, and given a coat of oil to protect the metal parts from rust.—A. M. Parker, Edmonton, Can.

Useful Periscope Which a Boy Can Make

Mention of periscopes is quite common in the reports from European battle fields; such a device in a simple form can be made easily by boys who have fair skill with tools. The illustration shows a periscope which may be used for play, and has other practical uses as well. In a store or other place where a person on duty cannot watch all parts of the establishment,



This Simple Periscope Is Useful Both for Play and Practical Purposes

such a device is convenient in that it will reflect persons entering the door. As a toy or for experimental purposes the periscope shown has many possibilities, and will appeal to youngsters.

It consists of a square box, 18 in. long, open at the ends. It is 3½ in. wide and made of wood, ⅜ in. thick. A mirror is fitted at an angle of 45° near one end of the box or tube, as shown in the sketch. The front of the mirror is opposite a three-cornered opening in the box which extends across one side. The opposite end of the tube is also fitted with a mirror in the same manner, except that the front of the mirror faces to the opposite side of the box at which there is also an opening. In using this device, the user sights from the point indicated by the eye. The image is reflected in the mirror at the top and thrown onto the lower mirror, where it may be seen without exposing the head above the level of the lower opening. It is this application of reflection by mirrors that makes it possible for soldiers to see distant objects without exposing themselves to fire, by the use of the periscope.

ATTRACTIVE FIRE STATION BUILT LIKE A BUNGALOW

Two Views of an Artistic Fire Station in a Suburb of Portland, Oregon, Showing the False Bay Window Which Serves as the Entrance to the Fire-Engine Room

WHEN plans were made to erect a fire station in Irvington, a suburb of Portland, Ore., the structure was designed to resemble a bungalow so that it would harmonize with the architecture of the neighboring dwellings. While the idea is not altogether new, the result in this case is particularly artistic and attractive. The front part of the structure is occupied by a big living room pleasingly fitted up for the use of the firemen. The homelike plan is even carried so far as to provide white curtains at the windows. To one side of the wide veranda is what appears to be a bay window, with flower boxes on the window sills. In reality this bay is made up of two hinged doors that serve as the entrance to the garage, where the fire apparatus is kept in readiness.

IN accordance with the editorial policy of this magazine never to accept compensation in any form for what appears in our reading pages, and also to avoid all appearance of doing so, we are obliged to omit the name of the maker or the seller of any article described. This information, however, is kept on file and will be furnished free, by addressing Bureau of Information, Popular Mechanics Magazine, Chicago. [Editor.]

Victor

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Think of having Elman, Kreisler, Paderewski, Powell, Zimbalist and other famous instrumentalists play for you; of hearing Sousa's Band, Pryor's Band, Conway's Band, Vessella's Band, Victor Herbert's Orchestra and other celebrated musical organizations; of enjoying the inimitable witticisms of Harry Lauder, Nora Bayes, Raymond Hitchcock, Mizzi Hajos and other leading entertainers.

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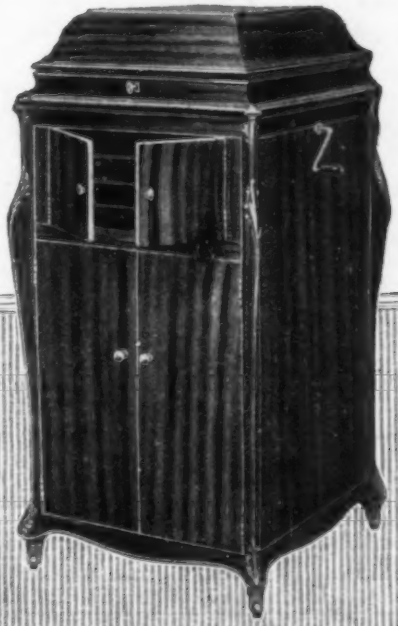

Other styles of the Victor and Victrola $10 to $400

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WHEN HE WAS A BOY (BOY-LIKE) HE WROTE THIS:

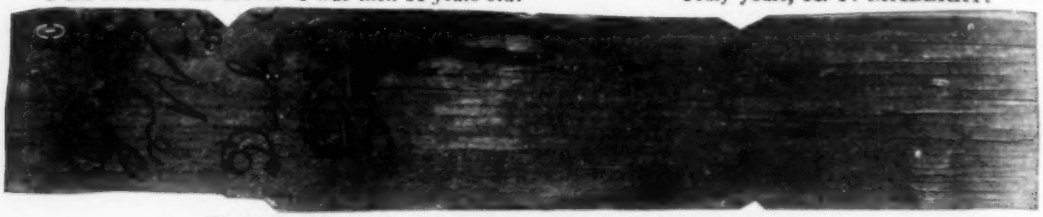
This was when they were shingling their new home, in February, 1867.

46 YEARS LATER, WHEN HE WAS A MAN, HE WROTE THIS:

Southern Cypress Mfrs.' Assn., New Orleans, La. Cotton Plant, Ark., *March 5, 1913.*

Gents: I send you by this mail a sample of shingles placed upon my old homestead by my father in 1867. The pencil writing on same was done by me at the time the workmen put them on. They have done service from that day to the 2nd day of April, 1912, when they were removed for new building.

I can swear to the above. I was then 11 years old. Truly yours, A. F. MABERRY.



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45 years "on the job"—and still sound as a dollar.

Here is the original of the above letter:

Cotton Plant, Ark., Mar 5th 1913

Southern Cypress Mfgs. Ass
New Orleans La.

Gents: I send you by this mail a sample of shingles placed upon my old homestead by my father in 1867. The pencil writing on same was done by me at the time the workmen put them on. They have done service from that day to the 2nd day of April 1912 when they were removed for new building. I can swear to the above I was then 11 years old.

Truly Yours
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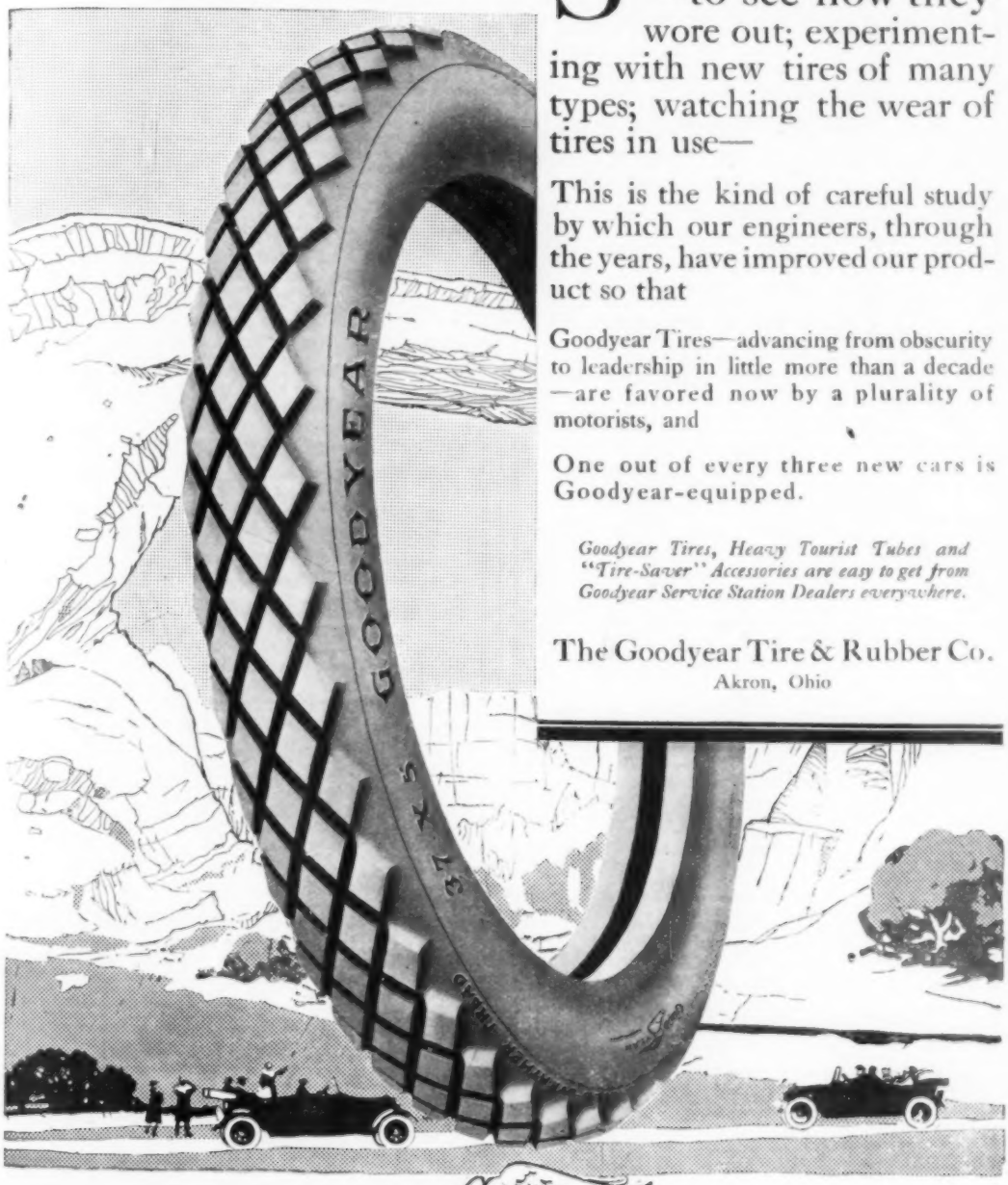

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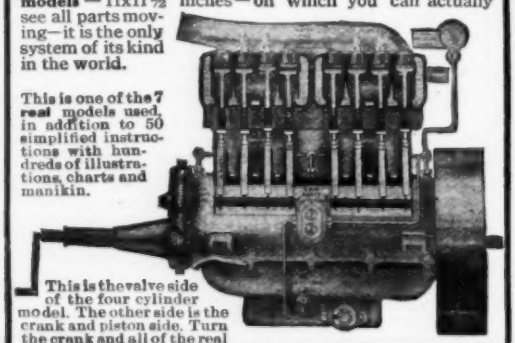

This is one of the 7 **real** models used, in addition to 50 simplified instructions with hundreds of illustrations, charts and manikin.

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ALL departments of Popular Mechanics Magazine purchase manuscripts and pictures—either photographs or drawings. Material is passed upon promptly and payment is made upon acceptance. For the general reading section contributions should relate to new developments in the fields of science, mechanics, invention, and discovery. Photographs may be of any size, providing they are sharp and accompanied by accurate descriptive data.

The Shop Notes and Amateur Mechanics departments use new ideas and kinks for workmen of all crafts and amateurs of all ages, respectively. Pencil sketches are acceptable; descriptions should be brief and in simple language.—Editor.

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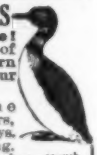

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The Crimes We Commit Against Our Stomachs

By

Arthur True Buswell, M. D.

EUGENE CHRISTIAN

A MAN'S success in life depends more on the co-operation of his stomach than on any other factor. Just as an "army moves on its stomach" so does the individual. Scientists tell us that 90% of all sickness is traceable to the digestive tract.

Physical efficiency is the backbone of mental efficiency. Unless our stomachs are effectively performing their functions in the way Nature intended, we can't be physically fit. And unless we're physically fit, we can't be thoroughly successful.

As Dr. Orison Swett Marden, the noted writer, says, "the brain gets an immense amount of credit which really should go to the stomach." And it's true—keep the digestive system in shape and brain vitality is assured.

Of course, there are successful men who have weak digestions, but they are exceptions to the rule. They succeeded *in spite* of their physical condition. Ten times the success would undoubtedly be theirs if they had the backing of a strong physique and a perfect stomach. There are a thousand men who owe their success in life to a good digestion to every one who succeeded in spite of a poor digestion and the many ills it leads to.

The cause of practically all stomach disorders —and remember, stomach disorders lead to 90% of all sickness—is wrong eating.

Food is the fuel of the human system, yet some of the combinations of food we put into our systems are as dangerous as dynamite, soggy wood and a little coal would be in a furnace—and just about as effective. Is it any wonder that the average life of man today is but 39 years —and that diseases of the stomach, liver and kidneys have increased 103% during the past few years!

The trouble is that no one has, until recently, given any study to the question of food and its relation to the human body. Very often one good harmless food when eaten in combination with other harmless foods creates a chemical reaction in the stomach and literally explodes, giving off dangerous toxics which enter the blood and slowly poison our entire system, sapping our vitality and depleting our efficiency in the meantime.

And yet just as wrong food selections and combinations will destroy our health and efficiency, so will the right foods create and maintain bodily vigor and mental energy. And by right foods we do not mean freak foods—just good, every day foods properly combined. In fact, to follow Corrective Eating it isn't even necessary to upset your table.

Not long ago I had a talk with Eugene Christian, the noted food scientist, and he told me of some of his experiences in the treatment of disease through food. Incidentally Eugene Christian has personally treated over 23,000 people for almost every non-organic ailment known with almost unvaried success. An enviable record when one considers that people nearly always go to him after every other known method has failed.

One case which interested me greatly was that of a young business man whose efficiency had been practically wrecked through stomach acidity, fermentation and constipation resulting in physical sluggishness which was naturally reflected in his ability to use his mind. He was twenty pounds underweight when he first went to see Christian and was so nervous he couldn't sleep. Stomach and intestinal gases were so severe that they caused irregular heart action and often fits of great mental depression. As Christian describes it, he was not 50% efficient either mentally or physically. Yet in a few days, by following Christian's suggestions as to food, his constipation had completely gone although he had formerly been in the habit of taking large daily doses of a strong cathartic. In five weeks every abnormal symptom had disappeared—his weight having increased 6 lbs. In addition to this he acquired a store of physical and mental energy so great in comparison with his former self as to almost belie the fact that it was the same man.

Another instance of what proper food combinations can do was that of a man one hundred pounds overweight whose only other discomfort

was rheumatism. This man's greatest pleasure in life was eating. Though convinced of the necessity, he hesitated for months to go under treatment believing he would be deprived of the pleasures of the table. He finally, however, decided to try it out. Not only did he begin losing weight at once, quickly regaining his normal figure, all signs of rheumatism disappearing, but he found the new diet far more delicious to the taste and afforded a much keener quality of enjoyment than his old method of eating and wrote Christian a letter to that effect.

But perhaps the most interesting case that Christian told me of was that of a multi-millionaire—a man 70 years old who had been traveling with his doctor for several years in a search for health. He was extremely emaciated, had chronic constipation, lumbago and rheumatism. For over twenty years he had suffered with stomach and intestinal trouble which in reality was superaciduous secretions in the stomach. The first menus given him were designed to remove the causes of acidity, which was accomplished in about thirty days. And after this was done he seemed to undergo a complete rejuvenation. His eyesight, hearing, taste and all of his mental faculties became keener and more alert. He had had no organic trouble—but he was starving to death from malnutrition and decomposition—all caused by the wrong selection and combination of foods. After six months' treatment this man was as well and strong as he had ever been in his life.

These instances of the efficacy of right eating I have simply chosen at random from perhaps a dozen Eugene Christian told me of, every one of which was fully as interesting and they applied to as many different ailments. Surely this man Christian is doing a great work.

I know of several instances where rich men and women have been so pleased with what he has done for them that they have sent him checks for $500 or $1000 in addition to the amount of the bill when paying him.

There have been so many inquiries from all parts of the United States from people seeking the benefit of Eugene Christian's advice and whose cases he is unable to handle personally that he has written a little course of lessons which tells you exactly what to eat for health, strength and efficiency. This course is published by The Corrective Eating Society of New York.

These lessons, there are 24 of them, contain actual menus for breakfast, luncheon and dinner, curative as well as corrective, covering every condition of health and sickness from infancy to old age and for all occupations, climates and seasons.

Reasons are given for every recommendation based upon actual results secured in the author's many years of practice although technical terms have been avoided. Every point is explained so clearly that there can be no possible misunderstanding.

With these lessons at hand it is just as though you were in personal contact with the great food specialist because every possible point is so thoroughly covered that you can scarcely think of a question which isn't answered. You can start eating the very things that will produce the increased physical and mental energy you are seeking the day you receive the lessons and you will find that you secure results with the first meal.

If you would like to examine these 24 Little Lessons in Corrective Eating simply write The Corrective Eating Society, Department 512, 460 Fourth Ave., New York City. It is not necessary to enclose any money with your request. Merely ask them to send the lessons on five days' trial with the understanding that you will either return them within that time or remit $3.00, the small fee asked.

The reason that the Society is willing to send the lessons on free examination without money in advance is because they want to remove every obstacle to putting this knowledge in the hands of the many interested people as soon as possible, knowing full well that a test of some of the menus in the lessons themselves are more convincing than anything that can possibly be said about them.

Please clip out and mail the following form instead of writing a letter, as this is a copy of the official blank adopted by the Society and will be honored at once.

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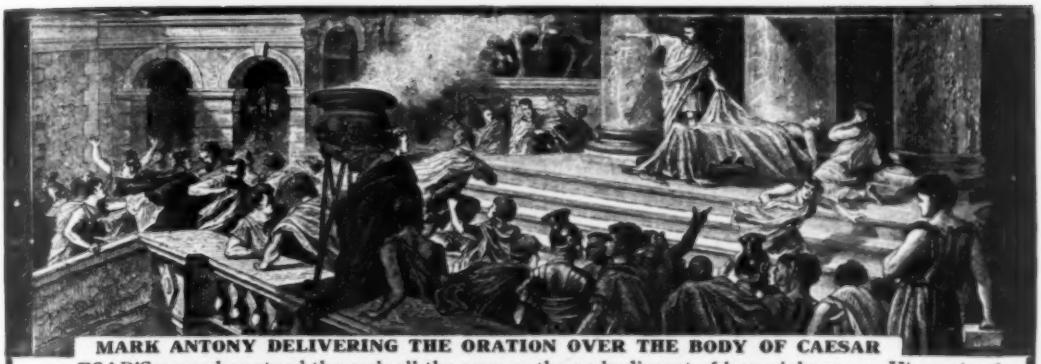

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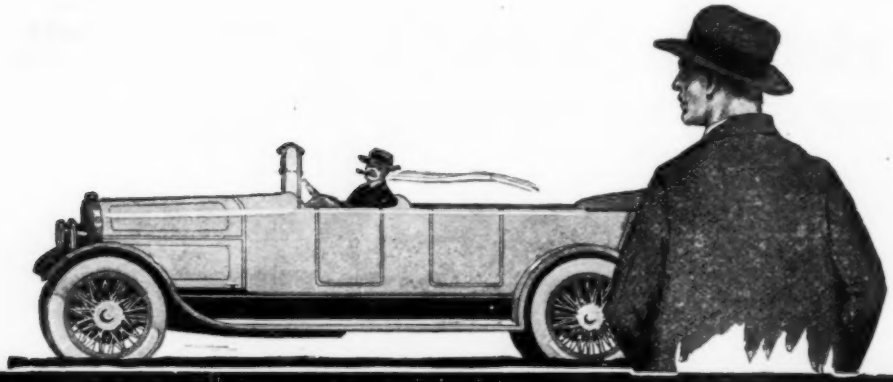

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The Law of Will-Power in Habits.
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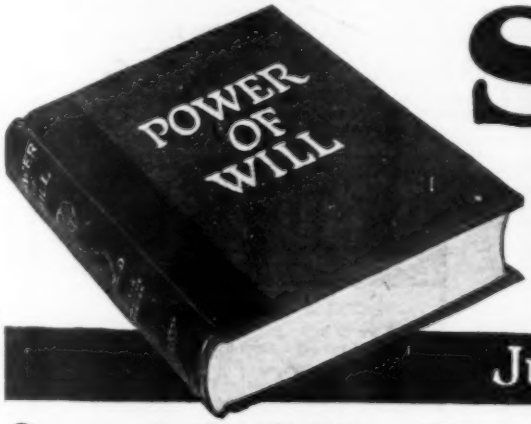
Fifteen Methods of Mastering Anger and Irritability.
Etc., Etc., Etc.
This is only a partial list—a complete list of contents would nearly fill this page.



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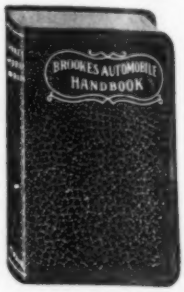

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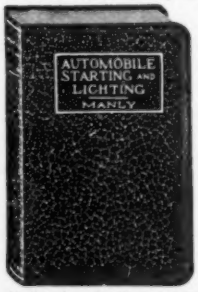

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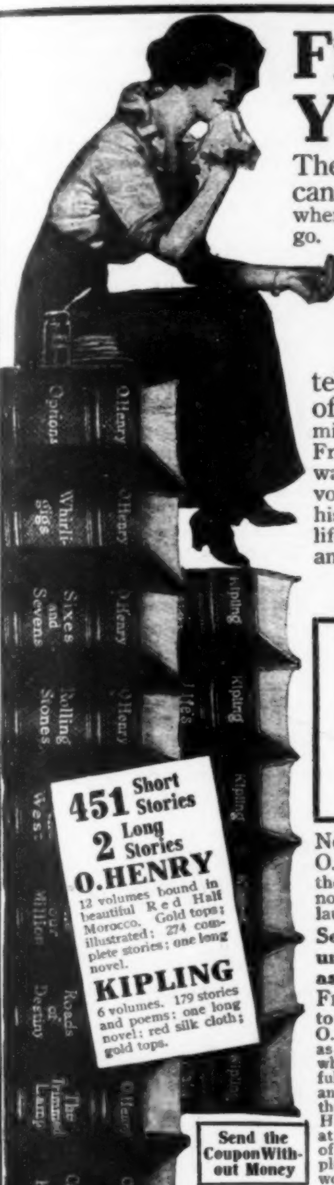

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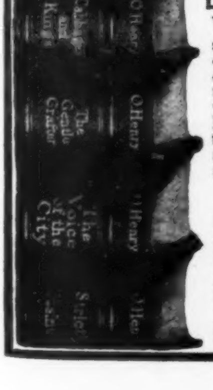

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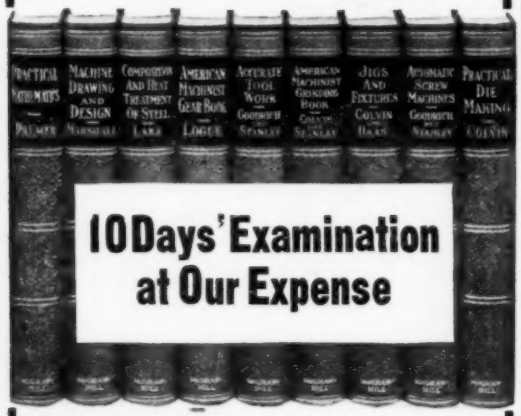

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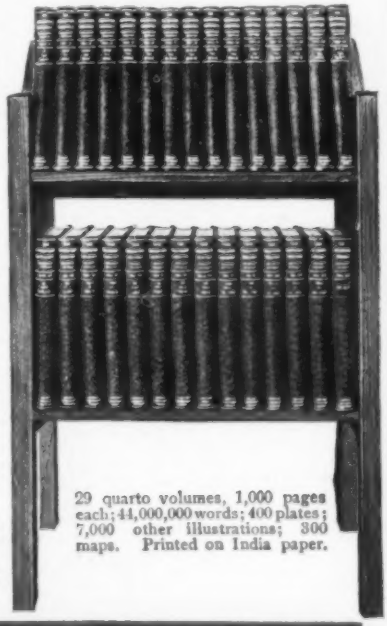

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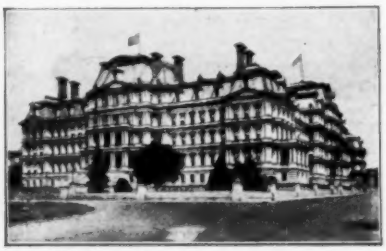

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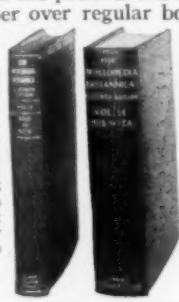

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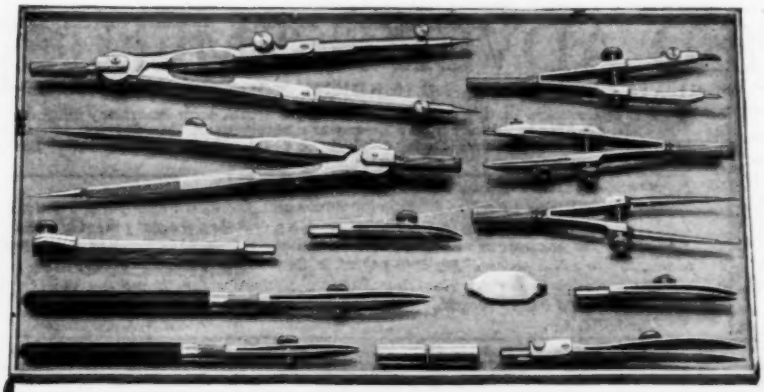

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MANUFACTURE Wizard Washing Tablets, latest Washing Wonder; enormous sales. Putman's Dry Cleaner, Iron Rust Soap, Radilite Washing Marvel, Non-Alcoholic Tube Flavors, Egglene (wonderful egg substitute), Pyreen Fire Extinguisher, Gas Tonic, Puncture Plugger, Hi-class Automobile Specialties. I furnish correct guaranteed formulas with plain instructions for these and all latest Agents' and Mail-Order Goods. Latest Lists, Stamp. Miller, Manufacturer's Chemist, Tampa, Florida.

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SALESMEN now taking orders on new fall and winter line, selling custom made shirts direct to wearer; can place few additional men, whole or part time; previous experience unnecessary; liberal commissions. Wright Shirt Works, Asbury Park, N. J.

WANTED—Tailoring Agents—Everywhere. Spring season 1917. Live wires investigate before making arrangements for coming season. Get on the Nelson band wagon of successful agents—"Nelson System of Special Values." Four prices only. Large assortment to sell for $15.00. Also big Raincoat line. Nelson Tailoring Co., 241 W. Van Buren St., Chicago.

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MAKE and sell your own goods. Formulas by Expert Chemists. Manufacturing Processes and Trade Secrets. Formula Catalog for Stamp. Blake Mystic Company, Washington, D. C.

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WANTED—Active men to sell simplex gas plants; no experience required; can make $300 to $500 per month; others are doing it, so can you. Address Simplex Gas Plants Co., 154 Whiting St., Chicago, Ill.

"HANDY" Dish Washer, attaches to water faucet. 100% profit. Other specials. The Pangburn Specialty Co., Box 163, Dept. L, Scranton, Pa.

AGENTS Sell Crystal Compound; it's a wonder; washes clothes without rubbing or boiling without injury. A whirl-wind seller and repeater. Send dime for sample and agents' proposition. Utility Co., Dept. E, Chippewa Falls, Wis.

TOOTHPICK receptacle, shown on page 597, October issue. Sample and prices sent for 60c. Dickson & Jones Manufacturing Co., 243 Franklin St., Elizabeth, N. J.

LADIES and Gentlemen to Sell Photo Pillow Tops, Photo Pennants and Luminous Crucifixes. Great Holiday Articles. Photo Pillow Top Co., 2134 W. Gladys Ave., Chicago.

AGENTS Wanted for Derrick's Magic Cleaners. Unapproached for white shoes, clothes, furniture, household, workshop. Surpasses dry-cleaners. Real opportunity. Derrick, 1126 North Clark, Chicago, Ill.

HURRY—Big money! Our large assorted Christmas package; sells in every home. Free particulars. Harding Sales Co., 4433 N. Harding Ave., Chicago.

GUARANTEED Custom Raincoats. Biggest Commissions, Largest Line, Lowest Selling Prices. Best Free Offers. Guaranteed Raincoat Co., Dept. A, Boston, Mass.

AGENTS—$42.00 weekly selling our new household articles. Sells everywhere. Samples free. Write at once. Berg Company, Dept. E12, Hendrum, Minn.

AGENTS—Sell Moving Pictures on Post Cards; the greatest curiosity; 25c brings samples and list. International Postal Card Service, 404, Tacoma, Wash.

AGENTS—500% profit. Sign Letters for office and store fronts. Samples and particulars free. Inter State Letter, 2453 N. Halsted St., Chicago.

YIPE guarantees every man a dry, cool, mild smoking pipe. Absolute nicotine dissolvent. Every pipe smoker buys. Big profits. Particulars with sample, 10c. C. A. Standfast, Fordham, N. Y. City.

AGENTS make 500% profit handling auto monograms and initials, window letters, changeable signs and holiday decorations. Catalog free. Hinton Co., 6142 40th Court, Chicago, Ill.

WANTED—Agents that can sell reliable, needful, classy, big profit producing articles of real merit. Illustrations free. Clare Daniel Co., 1208X Alaska Bldg., Seattle, Wash.

VEST Pocket Number. For side line. Just one style—one size—sample outfit weighs 2 ounces. Sell one or more parties in each town—ten minutes to sell 100 to 1,000 first time, and they always buy again. Special favorite with Jewelers, Druggists and Stationers. Liberal commissions. If you fail to sell and report the call, we get the order and pay you just the same. Samples now ready. Give permanent address. American Calendar Co., Greeneville, Tenn.

AGENTS—500% profit—$30.00 to $100.00 a week. That's what our agents are making selling our new metallic Sign Letters for office windows, store fronts and glass signs of all kinds. No experience necessary. Any one can put them on and make money right from the start. One agent says: "Have already put up 14 signs in this little burg and more in sight. Your letters are the best thing I have seen in years. Will soon be in a position to buy in 5,000 lots." Another says: "I am getting all the work I can do and the letters have given entire satisfaction everywhere." We are daily receiving such letters from our agents. This is the only field not overcrowded. There is a big demand for window lettering everywhere. You can sell to near-by trade or travel all over the country. Write today for a free sample and full particulars. Metallic Letter Co., 407 N. Clark St., Chicago, U. S. A.

233% PROFIT selling Jubilee Spark Intensifiers to automobile owners, garages. Sure cure for Spark Plug troubles. Sells like wildfire. Brand new. Exclusive territory. Write today. Jubilee Mfg. Co., Dept. M-1, Omaha, Nebraska.

AGENTS: You can make big money taking orders for our fine made-to-measure clothes, so write quick for 60 beautiful cloth samples, 32 smart styles in rich colors, wholesale and retail price lists, lowest prices and best offer to agents. $7.00 to $10.00 a day easy. Big outfit, over 250 samples free to live wires. No experience needed—no capital. We furnish everything free—pay postage or express charges—back you, boost you, show you how and clearly explain everything. Costs nothing to try. Let us make you a stylish suit to measure to prove our fine quality and style. Send postal or letter today. Paragon Tailoring Co., Dept. 1214, Chicago.

AGENTS make big profits handling our "Fast Selling Holiday Post Cards," "Novelty Signs," "Holiday Decorations," "Pennants," Etc. 5,000 varieties. Demand unlimited. Write today for Free Catalog. Sullivan Co., 1123 Van Buren St., Chicago, Ill.

BIG Profits for You! Manufacture Barley Crisp. New Confection, 5c package costs you 1c. Machine instructions complete $7.50 prepaid. Send 10c for samples. Barley Crisp Co., 1205 Broadway, San Francisco.

AGENTS wanted everywhere, sell Feather Flowers. Clean, Pleasant, Profitable. Big Christmas Seller. Stores, canvassers, fairs, poultry shows, etc. Sample fifteen cents. DeWitt Sisters, R. F. D. Ten, Battle Creek, Mich.

SELL something sensible and absolutely new, original and satisfying. The Little Witch Vacuum Cleaner sweeps, without dust, carpets, rugs, upholstered furniture or bare floors. It does work of broom, carpet sweeper, and vacuum cleaner. Weighs, 3½ pounds. Lightest, lowest priced, best. Gives Vacuum Cleaning a new meaning. Satisfaction or money back. Get our prices and reserve territory. United Distributing Companies, Inc., 2018 Edison Bldg., Chicago.

AGENTS—Stamping names on Pocket Key Protectors; sample Check with your name and address, 12c. Stamping Outfits, Emblem Checks, Check Fobs, Name Plates. Hart Mfg. Co., Desk 2, 303 Degraw St., Brooklyn, N. Y.

AUTO Owners: We want a few live motorists who drive their own cars to introduce International Rubber Half-Sole Tires in their territory. Greatest tire-cost reducer ever offered to the motoring public. Practically sells on sight—our sales jumped 400% in ninety days. For details write the International Rubber Company, 112 West Tennessee, Denver, Colo.

AGENTS — Agents — Don't bother with slow-selling, small-profit goods. You can make big daily profits selling our 14 repeat-order Automobile Specialties. These Auto Specialties get the business and your selling field is unlimited. Write today for our offer. National C. & Mfg. Co., Dept. D-25, 20 W. Lake, Chicago.

EARN $50 to $100 monthly distributing Parker Hosiery to repeat customers at mill prices. All or spare time. Protected territory. Credit. D. Parker Mills, 2733 No. 12th St., Philadelphia, Pa.

$6 COMMISSION each sale and repeat orders. Traveling salesmen every state. Main or sideline. New, rapid selling automobile accessory used all makes cars. Samples loaned. Weekly settlements. Toledo Cable Co., 119 Davis Bldg., Toledo, O.

NEW 1916 Model. Send no money, just your name on a postal card, and learn by return mail how to get the best Vacuum Cleaner made, without costing you one cent. Shipped direct from factory. Guaranteed five years. Live agents wanted. Write today. The Warner Co., Dept. P, Muncie, Indiana.

AGENTS—Revised prices. Big increase in profits. Free sample and particulars. Delbare's Naptha Washing Tablets. Wash clothes clean without rubbing. Guaranteed not to injure the finest fabric. No acids, lime or caustics. Manufactured by Naptha Washing Tablet Company, 714 So. Dearborn, Chicago.

YOU can be your own boss with our Key Check outfit. Good for $5 a day stamping names on pocket key checks, fobs, etc. Sample check with your name and address, 15 cents. Pease Die Works, Dept. M., Winchester, N. H.

SOMETHING new and different: Shure Shine for Automobiles, Furniture, etc. Fast seller. Enormous field. Exclusive territory to hustlers. For particulars and sample write Daydark Co., Desk S4, St. Louis Mo.

AGENTS to sell our patented inkwell—has unique features. Harold Chesson & Son, West Brookfield, Mass.

FAST Selling "Kantleak" Raincoat proposition. Cooper earned $60 in 5 days. Bridge $88 in 6 days. We deliver and collect. New 1916 swatches free. Write today. Comer Mfg. Co., 124 Paige St., Dayton, Ohio.

FREE to Agents—The Universal and Agents' Price List. Marvelous opportunities. Big profits. Universal Supply House, Box 1743, Los Angeles, Calif.

SELL our Stamp, Gum, Match Vending Machines, etc. Liberal commissions. Catalogue Free. Northwestern Novelty Co., Box 943, Morris, Illinois.

AGENTS—If $1 an hour looks good, write N-I. Mfg Co., St. Louis, Mo.

SELL Handy Sanitary Toilet Bowl Cleaners; patented novelty. Handy Cleaner Co., Utica, N. Y.

AGENTS—Men or Women. A real honest-to-goodness-sells-itself line—over 250 light-weight, popular-priced necessities. We pay 100% commission. $6 a day can be made at the start. No capital—no experience required. Enormous demand—sells fast—big repeaters. Valuable territory opened—all or spare time. Elegant agent's outfit furnished free. Write today. Postal will do. American Products Co., 9239 3rd St., Cincinnati, O.

AGENTS. Guaranteed clothing tailored to measure. Territory for permanent business. C. J. Fowler & Co., Yonkers, N. Y., Dept. B.

$61.50 WEEKLY. Introducing and selling a new gas light burner for kerosene lamps. Beautiful light. No chimney. No mantle. Samples free. Luther Manufacturing Co., Dept. 242, Cincinnati, Ohio.

AGENTS—Here's a winner. The Midget Vest Pocket Garment Hanger—sells on sight. The most attractive proposition ever offered. 150% profit. No competition, as article is fully protected by U. S. and foreign patents. Address: Dept. "M," The Silvex Company, South Bethlehem, Pa.

AGENTS—Send for free copy of "The Thomas Agent." Greatest agent paper published. Filled with money-making plans and experiences of successful agents. Address Editor Thomas Co., 1262 North St., Dayton, O.

AGENTS—500 per cent profit; get our monograms for autos and motorcycles, etc., by transfer method. Western Motorist Accessories Co., Cheyenne, Wyoming.

AGENTS—To sell the newest electric appliance on the market; sold everywhere there is electricity, in the home and office, store and factory. Liberal profits; sales-driving sample, weighs a pound, no experience or knowledge of electricity required; it shows how to use one light instead of two and get the same results. Sells for $5.00 and $3.50, and saves the purchaser an investment of $25. Write for particulars. The Handy Light Co., 113 Handy Light Block, Cincinnati, Ohio.

PHOTO Pillow Tops, Portraits, Frames, Sheet Pictures, Photo Plates, Pennants. Rejects credited. Prompt shipments; samples and catalogues free to agents; 30-days' credit. Jas. C. Bailey Co., Desk P-1, Chicago.

TAKE orders for men's custom tailoring, part time or all time. We furnish samples and everything needed to make a success without experience. Low prices; fit guaranteed or money refunded. You make good money on every order. You can wear swell clothes for almost nothing. Write quick for samples and all information if you live in a town smaller than 5000 or on R. F. D. Knickerbocker Tailoring Co., Dept. 549, Chicago.

AGENTS—Manufacture Puffed Crisp Confection. Great seller. Big profits. Machine, instructions, $3.75 prepaid. Samples 10c. Mohler, Monon Bldg., Chicago.

GENERAL Agents—Capable of calling on the big trade themselves and handling canvassers for the house to house and office to office business, to sell the newest electric specialty on the market; sold everywhere there is electricity—in the home, office, factory, store, hotel; liberal profits; sales-driving sample, weighs a pound; no experience or knowledge of electricity required; shows how to use one light instead of two and get the same results; sells for $3.50 and $5.00, and saves the purchaser an investment of $25.00. Write for particulars. The Handy Light Co., 161 Handy Light Block, Cincinnati, Ohio.

AGENTS: Cooper made $314 last month; $91 last week, selling "Kantleak" Raincoats. New proposition. We deliver and collect. Sample coat free to workers. Comer Mfg. Co., 24 Paige St., Dayton, Ohio.

I PUBLISH a wonderful magazine of money making plans, ideas, suggestions and inspiration! Will show you how to make more money. Sample, 10c. Editor, Booster Magazine, Northwestern Building, Chicago.

A MARVELOUS Selling Article! Used in every home. Silvron! The polish that actually rubs on Sterling Silver. Big profits. New selling plan. Write for sample and offer. Silvron, 157 Cedar, New York.

MEN and Women—$1,500 to $3,000 yearly taking orders for over 90 household articles. Outfit free. Big chance. Full particulars. Duo Factories, Dept. B58, North Java, N. Y.

AGENTS — Sell California Rosebeads. Swell line. Large profits. Goods postpaid. Write for catalog today. Mission Bead Company, 2819PM West Pico, Los Angeles, Cal.

152% PROFIT to Agents. Why pay $20 to $35 for check protector? Our machine carried in vest pocket. Perforates and inks. Complies with the law. Send $1 for sample. Bear Check Protector Co., P. O. Box 194, Cincinnati, Ohio.

AGENTS. Yankee pot strainer and wax pad and iron rest sell like hot cakes. Write for particulars. Charles Purssell, 179 Broad St., Newark, N. J.

AGENTS—$50 a week. Will show you how. Genuine Gold Leaf window letters. Chicago Letter Co., 846 Altgeld St., Chicago.

AGENTS—A Gold Mine! New household article sells like lightning. Write quick for agency. The Vogel Mfg. Co., Sunbury, Pa.

SELL Keyless Padlocks. Big profits. Particulars free. Chaney Service Co., Dept. 4, Canton, Ohio.

STEAM-NO-MORE for eye glasses, wind shields; every auto owner a customer. Live agents, 200%. Send 10c for 25c sample. Gray's Sales Agency, Port Huron, Mich.

OUR line of sanitary brushes, mops and dusters is a winner. So is our proposition. Rich territory waiting. Agents wanted now. Sanford Brush Co., 544 W. Lake St., Chicago.

AGENTS—Salary or commission. Greatest seller yet. Every user pen and ink buys on sight. 200 to 500 per cent profit. One agent's sales $620 in six days; another $32 in two hours. Monroe Mfg. Co., X6, La Crosse, Wis.

LUMINOUS Crucifixes. Catholics buy them everywhere. Old Paduke, Paducah, Ky.

$3.00 to $10.00 DAILY—100% to 200% profit. Big Value Christmas Packages—post cards, tags, folders, seals, stickers. Sample 10c, dozen 60c. Rodolph, Northwestern Bldg., Chicago.

PORTRAIT Agents: Our goods will make you big profits. Delivery guaranteed. Rejects credited. Prompt shipments. Send for latest catalogue and prices. Adam J. Kroll & Co. 602 Blue Island Ave., Chicago, Ill.

MAKE money selling our Milk Bottle Opener. Particulars free. P. Simco, Tompkinsville, New York.

AGENTS—50 Calling Cards, 10c. F. Shepard, Rome, N. Y.

ENORMOUS profits lettering windows. "Climax" gold letters. Free samples. Wadhams, 90 Broadway, Brooklyn.

BIG Money Easy Selling Uni-Lites. Agents can make $50 to $100 weekly in spare time. Equals 20 ordinary lamps or lanterns—300 candlepower. Used in house and out doors. Get new free Uni-Lite offer. Acorn Brass Mfg. Co., 1153 Uni-Lite Building, Chicago.

AGENTS—Send for sample "Fretnot"—the wash day wonder. Be convinced you can do a whirlwind business. You can clear at least $20 to $100 weekly, according to spare or whole time. You don't have to talk; if she doesn't buy at sight, leave sample; she will be looking for you long before you are able to make the rounds again. Samples furnished free. Premiums for your customers. Exclusive territory granted to agents who can produce. Credit given. Don't call. P. M. Motter & Sons, 3213 Warren Ave., Chicago.

POSTCARDS, 90c per 1,000 up. High-grade Christmas, New Years, Thanksgiving—40c per 100. Christmas packages, tags, seals, cards, etc., $2.50 per 100 up. Particulars free. Gross Onard Co., 2112 Lafontaine Ave., New York.

WHO wants to make more money selling brushes that every household needs? Special method of getting entrance to demonstrate. Fuller Sanitary Brushes are nationally advertised — largest output — best terms and prices—western distributing stations. Your territory is valuable. Write. Fuller Brush Company, Hartford, Conn.; Rock Island, Ill.

AGENTS—$5 daily selling our Handy Tool, 12 articles in one. Lightning seller. Sample free. Thomas Mfg. Company, 762 North St., Dayton, Ohio.

LARGE Manufacturer Wants Agents to sell made to measure raincoats direct to customers. Cheapest prices; outfit free. Standard Raincoat Co., 395 Broadway, N. Y.

TURN spare time into dollars. Something new. No canvassing or investment. Daydark Co., Desk 55, St. Louis, Mo.

HUGE profits selling Nibco Sanitary Brushes, Auto Washers, Brown Beauty Adjustable Floor Mops, Dustless Dusters, and other specialties. Big line. Fast sellers. Write today. Silver-Chamberlin Company, Department M, Clayton, New Jersey.

WANTED—Young man in every city to sell Price Tickets and Signs to all kind of merchants. Universal Sign Co., Lawrence, Mass.

AGENTS make 500 per cent profit selling our Auto Monograms and Initials, Window Sign Letters, Changeable Signs, and Show Cards. 1,000 Varieties, Enormous Demand. Sullivan Co., 1123 Van Buren St., Chicago, Ill.

TAILORING Agents Wanted—Big complete sample outfit and case, nearly 300 large cloth samples, 3 piece lists and everything needed for canvassing or use in store, free to live agents. $25.00 to $50.00 a week; may make more. Write us today for free elegant outfit to begin, cloth samples, wholesale prices, special offer on a suit for yourself and full information—see our wonderful values, beautiful fabrics and styles. Established 28 years. Every garment made to measure—everything guaranteed and express prepaid. Just send a postal. American Woolen Mills Co., Dept. 1214, Chicago.

LADY or Gentleman to Travel for old-established firm. No canvassing. Staple line. $18 weekly, pursuant to contract. Expenses advanced. G. E. Nichols, Philadelphia, Pa., Pepper Bldg.

INSYDE Tyres, inner armor for Automobile tires, double mileage and prevent punctures and blowouts. Quickly applied. Cost little. Demand tremendous. Profits unlimited. Details free. American Automobile Accessories Co., Dept. P, Cincinnati, O.

$1,000 PER Man per county. Strange invention startles world—agents amazed. Ten inexperienced men divide $40,000. Korstad, a farmer, did $2,200 in 14 days. Schleicher, a minister, $195 in first 12 hours. $1,200 cold cash made, paid, banked by Stoneman in 30 days; $15,000 to date. A hot or cold running water bath equipment for any home at only $6.50. Self-heating. No plumbing or waterworks required. Investigate. Exclusive sale. Credit given. Send no money. Write letter or postal today. Allen Mfg. Co., 217 Allen Bldg., Toledo, Ohio.

AGENTS: Make real money this year; not "paper money." Just think! Our Eradium (luminous) Articles Shine in the Dark. We manufacture a complete line so that every call can be turned into a sale. Everyone amazed at the wonderful possibilities of these goods. Our Eradium Bulb is easily attached to any light and "Locates Your Light in a Jiffy" in the darkest room. Our Eradium Crucifix showing the Christ figure in startling outline thruout the night sells to every Catholic. Our Eradium House Numbers (just out) are selling like Ford automobiles. Our Eradium Clock tells the time in the dark. Our Eradium Match Box sells like hot cakes everywhere. Garages, homes, etc. Our Eradium Switch Plate for hotels is a big seller. Write today for best proposition you ever heard of. Sole manufacturers, The Pioneer Corporation, 1259 West 63rd, Chicago.

AGENTS—200 per cent profit. Wonderful little article. Something new; sells like wildfire. Carry right in pocket. Write at once for free sample. E. M. Feltman, Sales Mgr., 9539 3rd St., Cincinnati, O.

AGENTS—Ho-Ro-Co Skin Soap and Toilet Goods plan beats everything for agents' profits. "Ho-Ro-Co.," 212 N. 2nd, St. Louis, Mo.

25 CENTS saves $5.00—Hercules Fireless Solder. This wonderful solder requires no heat, tools or skill to use. Squeezed from a tube and air hardens. Mends all metals, water and gas pipes, automobile radiators, water jackets, gasoline tanks, steam radiators, etc. Price 25c. Agents wanted. Hercules Supply Co., 726 President St., Brooklyn, N. Y.

LARGE Manufacturer wants representatives to sell shirts, underwear, hosiery, dresses, waists, skirts, direct to homes. Write for free samples. Madison Mills, 586 Broadway, New York City.

EVERY home on farm, in small town or suburb needs and will buy the wonderful Aladdin kerosene (coal-oil) Mantle Lamp. Five times as bright as electric. Tested and recommended by Government and 34 leading Universities. Awarded Gold Medal. One farmer cleared over $500 in 6 weeks. Hundreds with rigs or autos earning $100 to $300 per month. No capital required; we furnish goods on time to reliable men. Write quick for sample lamp for free trial, distributor's proposition and secure appointment in exclusive territory. Mantle Lamp Co., 633 Aladdin Bldg., Chicago, Ill.

AGENTS—"Exclusive features" are what make easy sales—I can gain attention, close the sale and collect the money on six customers with the exclusive features of my non-alcoholic flavoring extracts, while you are struggling with one customer on the old commonplace line of talk. So can you! Prove it! Write today—big summer sellers—extra summer profits. J. M. Pitkin Co., 626 R. St., Newark, New York.

MEDALLIONS—300% profits. Make up your own goods and be independent. Catalogue free. Resag Co., 1205 Randolph St., Chicago.

100% PROFITS easily made taking orders for our new patented Vacuum Sweeper. No traveling; experience unnecessary. Bailey made $150 last week. Write quick. United Vacuum Sweeper Co., 1315 West Congress, Chicago.

AGENTS—Our gold window letter proposition beats 'em all. Stalbrite Co., Dept. P, 1115 Second Ave., N. Y. Established 1905.

GOOD income refinishing chandeliers, brass beds, etc., by new method, producing amazing results; no capital or experience necessary; write for information. Gunmetal Co., Ave. H, Decatur, Ill.

AGENTS Wanted: Sell Polishing Cloths, Rust Remover, Food Flavors, etc. 150 household necessities, guaranteed line, big profits, quick repeater, permanent business. Stuart & Co., 16 Main St., Newark, N. Y.

SIGN Letter Agents and Painters: 500% Profit Gold and Silver Sign Letters for Stores and Office Windows. Anyone can put on. Big demand. Free samples. Metallic Letter Co., 404 N. Clark St., Chicago.

AGENTS! Unprecedented opportunity to make good money selling wonderful Angle Lamps. Bought as soon as seen. Brilliant light below lamp where needed. 16 hours one quart oil. No shadow—smoke—odor. Crackerjack to demonstrate. Send for proposition to Dept. P. Angle Mfg. Co., 244 W. 23rd St., New York City.

A FEW reliable men or women to handle my 1916 Business Guide; sells everywhere; beginners clear $7 per day, 60% commission. Outfit Free. Prof. Nichols, Dept. P. M., Naperville, Ill.

AGENTS, sell reliable custom-made raincoats. Big commission. Complete sample line free. Temple Raincoat Co., Box 62, Templeton, Mass.

AGENTS—100% profit selling popular music. Samples and terms 25c. Ramsdall, Pub., 617 John, Utica, N. Y.

WE have three, real, live, new ones to offer at this time. Send in your name; don't delay. T. H. Snyder & Co., Cincinnati, O.

"1916's SENSATION!" Eleven piece toilet article set selling like blazes at $1.00 with $1.00 carving set Free! Enormous profits! Tremendous hit! Engle made $51.00 first week. Write quick! Pierce Co., Dept. P., 906 Lake St., Chicago.

AGENTS—Make a dollar an hour. Sell Mendets, a patent patch for instantly mending leaks in all utensils. Sample package and catalogue of household specialties free. Collette Mfg. Co., Dept. 404A, Amsterdam, N. Y.

SELL "Tasco" Polishing Cloths, 10c size 150%—25c size 100%. Samples and posters free. Delivery prepaid. Money refunded if not satisfactory. Send four stamps for terms and sample. Tasco, 1477-J Rowland Street, N. Y. City.

LARGE manufacturer wants agents to sell Aero Raincoats. Litte earned $90 in four days; Jeff earned $100 in six days. We deliver and collect. 1916 swatches free. Act immediately. Amer-Europ-Raincoat Co., Desk P, 175 E. Broadway, New York.

250% PROFIT—Puncture-Proofing Tires. Sea Kelp Products, Colegrove, Cal.

JOIN The Big Christy Organization. Sell Household Necessities. Unlimited Demand. Big Specialties. Enormous Profits. Apply Immediately. Arthur N. Christy & Co., Dept. 34, Newark, New York State.

DECALCOMANIA Transfer Initials and Monograms: You apply them on automobile while they wait; cost 2c each; profit $1.38 on $1.50 job; free particulars. Auto Monogram Supply Co., Dept. 1, Niagara Bldg., Newark, N. J.

"GOLDINE" Sign Letters—1,000% profit. Particulars free. Johnston Co., Quincy, Ill.

$15.00 MADE first day by 13-year-old boy with Shomescope. Woman made $8.00 first hour. Particulars free. Shomescope Mfg. Co., 523 W. 13th St., Kansas City, Mo.

AGENTS make $100 monthly selling our 500 handy household articles. Catalogue free. Scheff Company, Desplaines, Ill.

AGENTS make big money and become sales managers for our goods. Fast office sellers. Fine profits. Particulars and samples free. One Dip Pen Company, Dept. 2, Baltimore, Md.

READ the Agents Magazine and make more money. 2 issues 10c. Agents Magazine, Chicago.

AGENTS, be prosperous. Free: Successful Salesmanship and Secret of Large Profits. G. Home, 1957 Warren, Chicago.

AGENTS Wanted Everywhere—To sell our attractive theatre Brass Poster Frames, Changeable Signs, Building Directories, Brass Signs, Brass Railings, Bank Fixtures, Adjustable Electric Light Brackets. Big demand; easy sales. Established 1882. Newman Manufacturing Company, Cincinnati, Ohio.

WANTED—Reliable Men and Women to place our Eggine in stores and appoint sub-agents. Takes the place of eggs in baking and cooking at less than 5c doz. Chas. Morrissey Co., 4403-5 Madison St., Chicago.

RAINCOATS, direct from factory to wearer. Agent's price $2.65 delivered. Retail price $5.00. Agents average six coats daily. Rainy season now here. D. Lewis Raincoat Co., Cleveland, O.

AGENTS—Steady income. Large manufacturer of Handkerchiefs and Dress Goods, etc., wishes representative in each locality. Factory to consumer. Big profits, honest goods. Whole or spare time. Credit given. Send for particulars. Freeport Mfg. Co., 59 Main St., Brooklyn, N. Y.

EXCLUSIVE selling rights given for our Wonderful Triplex Folding handbag and other sellers. None sold in stores. Write for terms and catalogue. Diamond Bros., 35 West 21st Street, New York.

LADY or Gentleman to Travel for old-established firm. No canvassing. Staple line. $18 weekly, pursuant to contract. Expenses advanced. G. E. Nichols, Philadelphia, Pa., Pepper Bldg.

AGENTS—Here is a winner: Galvano Silver Cleaner. Sells in every home; 100 per cent profit; make $50 to $75 weekly. Send for particulars. Dalin Co., Forest Lake, Minn.

EASY, pleasant work for Mechanics, Shop Men, Clerks, during spare hours, will add many dollars to their salaries. Also want persons who can give full time. Big wages assured. Novelty Cutlery Co., 67 Bar St., Canton, Ohio.

$5 TO $15 profit a day selling most complete line Sanitary Household Brushes for every purpose. Our own make. Your territory awaits you. Write for attractive proposition. Puritan Sales Co., Dept. M, 1966 Broadway, New York.

AGENCIES WANTED

MANUFACTURER wants agencies for a new milk-bottle cap and carrier. Carney Novelty Co., 291 Division St., Pawtucket, R. I.

SALESMEN WANTED

SALESMEN calling on hardware, automobile accessories and garages can make big side money selling O-So-Ezy Cedar Oil Polish. Widely advertised. Standard equipment of Overland, Chalmers, Buick, Maxwell, Chevrolet and 25 other well-known makes. Our big free offer will help you close them. O-So-Ezy Products Co., Detroit, Mich.

WERE you ever offered a grocery store? Our proposition is better. Let us tell you how you can handle Flour, Canned Goods, Provisions—an entire line of Groceries, as well as Paints, Roofing, Stock Foods, Automobile and Machinery Oils and Greases. No rent to pay, no investment in stock. Large orders taken from samples. Goods of guaranteed and proven quality. Selling experience not necessary. Very profitable work for "workers." Address R. S. Bill, President, Hitchcock Hill Co. Chicago. Reference: Any bank or express company.

WE have openings for several live-wire salesmen capable of selling our famous Wear Proof Mat to managers of Public Buildings, Hotels, Theatres, Restaurants, Stores, Clubs—any place where foot mats are used. Earnings unlimited. Have men making from $3,000 to $10,000 a year. Goods are unequaled—acknowledged best on market. Write for full particulars, giving age, previous experience and connections. Wear Proof Mat Co., 500 So. Peoria St., Chicago.

SALESMAN wanted—To sell oils, belting, hose, paint, varnish, to factories, mills, auto owners, stores, threshers; outside, large cities. Excellent proposition. Paid weekly. O. L. Doty, Cleveland, Ohio.

SALESMAN—$6,000 Accidental Death, $30.00 Weekly Accident Benefit, $25.00 Weekly Sick Benefit, $10.50 yearly, half amount $5.50. $250,000 deposited Insurance Department. Experience Unnecessary, steady income for reliable men. Registration Dept. B, Newark, N. J.

SALESMAN Wanted—Strictly commercial proposition. Sold to mills, factories, railroads and other large consumers. Twenty per cent commission on every sale. Experience as salesman not essential. The W. E. Smith Mfg. Co., Cleveland, O.

IF you are a live one enter your name for samples of Duncan Ideal and Necessity Rugs. Liberal commissions ready Nov. 10th. J. C. Dunn & Co., Camden, N. J.

SALESMEN to sell Automobile Oil. Liberal commissions. Immediate drawing account. The American Turpentine Company, Cleveland, Ohio.

WANTED: Live-wire calendar and advertising novelty salesmen for unoccupied territory. Write for our proposition. Northwood Mfg. Co., Inc., Potsdam, N. Y.

INSTANTANEOUS calculator. Faster than calculating machines. Agent sample 36c. Michigan Novelty Co., Detroit.

WANTED—Someone in every city in United States to sell new specialty that every stenographer needs. Sells itself when shown. Liberal commission. The Neufeed Company, Asheville, North Carolina.

SALESMEN—Get our plan for Monogramming Automobiles and motorcycles by transfer methods. Very large profits. Motorists' Accessories Co., Mansfield, O.

SMOKER Wanted—We want silent salesmen who will smoke a pipe and get paid for it. Send no money, just write for particulars. M. H. Putnam, 607 West 51st Street, New York City.

$1.00 ALUMINUM check perforator. Wonderful seller. Sample 36c. Michigan Novelty Co., Detroit.

SALESMEN—To sell highest quality aluminum cooking utensils to dealers; liberal commission; salesmen can easily make $100 weekly; good side line. Address Ipalco, Lemont, Ill.

ADVERTISING Salesmen wishing to make a very profitable connection for 1917 should write us at once. Entirely new ideas to submit prospective customers; competition eliminated; exclusive designs, protected territory and liberal commission. The Hayes Lithographing Company, Lakeview Ave., Buffalo, N. Y.

SALESMEN—Acquainted with grocery trade. Large demand; liberal commission; pocket sample. Wirth Salesbook Co., Dept. P, Chicago.

STATE Managers Wanted. If you have ability to manage a sales force you can make from $5,000 to $7,000 a year selling rope machines. 35,000 sold. New Era Manufacturing Co., Plymouth Bldg., Minneapolis, Minn.

EARN $5,000 to $25,000 yearly. New business necessity. Retails $5 to $200. 100-200% profit. Purchaser satisfied or money refunded. No competition. Exclusive territory. Free samples. Sayers, 408 Wainright, St. Louis.

SALESMEN—Cover small towns, place Punch-Board Assortments on consignment; no selling; $3.00 per order. Devon Sales Co., Williamsburg, Maryland.

WANTED — Representatives everywhere. Exclusive territory. Gold sign letters for stores and office windows. Any one can put on. Write today for free sample. Metallic Letter Co., 403 N. Clark St., Chicago.

$7.50 COMMISSION each sale and repeat orders; traveling salesmen among general mercantile trade, every state; weekly settlement; no competition; pocket sample. Toledo Cable Co., 200 Davis Bldg., Toledo, O.

HELP WANTED

THE apprentice department of the General Electric Company at West Lynn, Mass., offers excellent opportunities for Grammar School Graduates to learn one of the mechanical trades in a four years' course; and to High School Graduates to prepare themselves for Draftsmen, Electrical Testers, and Installation men through a three years' course. Apprentices are admitted at all times and receive adequate apprentice wages from the beginning, both for shop and classroom work. Write for illustrated catalog. All applications should be sent to the Apprentice Department of the company.

THOUSANDS Men and Women Wanted for Government Jobs. $75.00 month. Steady work. Short hours. Common education sufficient. Write immediately for free list positions now obtainable. Franklin Institute, Dept. R-21, Rochester, N. Y.

THOUSANDS of Statues made with one rubber outfit. Instructions free. Joseph Roth, 45 Frost St., Brooklyn, New York.

DO you want a sure job with big pay, easy hours and rapid advance? Write for big free book, DW 29, which tells you how you can get a good Government position. Earl Hopkins, Washington, D. C.

SILVER mirrors, plating tableware, autobrass. Home plans free. Clarence Sprinkle, Dept. 28, Marion, Ind.

PHOTOPLAYS in demand. Make extra money. We show you how. Details free. Rex Publishers, Box 175 H 5, Chicago.

CIVIL Service Examinations open the way to good Government positions. I can coach you by mail at small cost. Full particulars free to any American citizen of eighteen or over. Write today for Booklet CE-29. Earl Hopkins, Washington, D. C.

WANTED. Men and women to qualify for Government positions. Several thousand appointments to be made next few months. Full information about openings, how to prepare, etc., free. Write immediately for booklet CG-29. Earl Hopkins, Washington, D. C.

RAILWAY Mail Clerks Wanted: Commence $75.00 month. Sample examination questions free. Franklin Institute, Dept. R-21, Rochester, N. Y.

EARN $75 to $150 a month. Easy work, lifetime positions. Book of Government Jobs Free to American citizens. Patterson Civil Service School, Box 3020, Rochester, N. Y.

MAKE money fast and easy in the auto business—on salary or in business for yourself. $75 to $300 a month. Wonderful opportunities. Day, night and correspondence courses—start any time. Get our free book now. Indianapolis Motor School, 121-A Southeastern Ave., Indianapolis, Ind.

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MEN, Learn the Auto Business—Earn big money or have a business of your own. We teach you by actual practical experience—driving, assembling, repairing, acetylene welding, ignition, battery work, machine-shop practice, etc. Best-equipped auto school in the country. Established 1905. 3,000 successful graduates. We help students earn their living. Write for free catalog and low rates. National School of Engineering, Los Angeles.

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YOUNG men wanted. For your character, abilities and talents analysis, write Prof. W. Lind, Box 337, New Rochelle, New York.

REPORTERS Wanted. Opportunity to earn good income. Morrison's Service, 1625 Greenleaf Ave., Chicago.

CIVIL Service information: Prepared by an expert, tells of opportunities, salaries and qualifications for high salaried positions in Western cities. Not a correspondence course, but facts you must know. 25 cents silver. Powell, 449 New York Block, Seattle.

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REPRESENTATIVES for every state in the Union. American Bureau of Credit Accounts, Clinton Bldg., Newark, N. J.

THE secret is out. Men without trades: Learn to clean wall paper. Costs 3 cents a room. All secrets and instructions $2. Have 13 years' experience. Particulars free. Geo. W. Moore, Box 1419, Butte, Mont.

WANTED—Men—Women, 18 or over, to become U. S. Government Clerks. $75.00 month. List of positions now obtainable—free. Write today. Franklin Institute, Dept. R-21, Rochester, N. Y.

MEN Wanted—Who like Drawing and Painting to learn excellent trade, at home. Jobs always open. Particulars Free. Nat'l Commercial Art School, Dept. A, Omaha, Neb.

EARN good money at home silvering French mirrors; no capital. Free instructive booklet. D. Malin, 284 Pacific, Brooklyn, N. Y.

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NO Strike: 8-Hour Day. Men Everywhere. Firemen, Brakemen, Baggagemen, $120. Colored Porters. Experience unnecessary. 810 Railway Bureau, E. St. Louis, Ill.

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MAKE money writing Photo-plays; details free to beginners. No correspondence course. Producers' League, 239 Wainwright, St. Louis.

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INVENT Something. It may bring wealth. Free book tells what to invent and how to obtain a patent through our Credit System. Waters & Co. Succeeded by Talbert & Parker, 4102 Warder Bldg., Washington, D. C.

WANTED

"UNITED Cigar Store Certificates" or United Profit-Sharing Coupons wanted. Will pay 70c per hundred for certificates, or 70c for 500 coupons. Zim's Coupon Exchange, 2426 Polk St., Chicago, Ill.

WANT Foot-power Screw-cutting lathe. Oscar Martenson, Axtell, Nebr.

WANTED—Pearls and Rare Minerals. Write for information. Hoag, 309 Security Bldg., Davenport, Iowa.

FOR SALE

WE have small supply of dentist's tooth-mirror's which we will sell to anyone for $1.00, while they last. It pays to know your teeth, or pay dentist. Will return money if supply is gone. B-724, City National Bank, Omaha, Nebraska.

SOLID Walnut Side-Board. Best offer till Dec. 1st takes it. Write for description, photo. Harry Darr, Alum Bank, Pa.

FOR Sale. Raccoons. Marine Engines. J. A. Loffelmacher, Fairfax, Minn.

TYPE and Printing Material at bargain prices. Now is the time to buy. All sizes rebuilt Job Presses very cheap. Catalogue free. Philadelphia Printers' Supply Co., 14 So. Fifth St., Philadelphia.

FOR SALE—Kerosene Mantle Lamp. New. Helge Lauridsen, Mason City, Neb.

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FOR Sale, 10x15 hand printing press and outfit. A. M. Carr, Valant, Pa.

FOR Sale—A new No. 4 Printograph; bargain. Geo. Joas, Chippewa Falls, Wis.

FOR Sale—Fly shuttle loom. A. E. Grothe, Burlington, Iowa.

UNIVERSAL Knitting Machines. Many styles and sizes. Hand machines and power machines, making seamless stockings, etc., plain or fancy. For catalogue address D. A. Bucker, Peabody, Mass.

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WANT to Swap. Send 10 cents for "The Market for Exchange," to Pierre Notley, 141 Milk Street, Boston, Mass. It gives a long list of those who have things to trade or sell. Send list of things you have to trade or sell.

BUSINESS built on Automobile. Pays $5.00 to $25.00 daily. Strang, West Unity, Ohio.

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MECHANICS and gunmen. Instructions for blueing and browning guns, rifles, steel or iron at small cost. No special tools needed. Same as factories use. Guaranteed. Price $1.00 (Money Order). E. J. Simon, Dane, Wis.

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SPECIAL bargains in second hand Attrition mills, burr mills, crushers, corn shellers, bran dusters, dust collectors, purifiers, reels, double, single, 2 and 3-pair high roller mills, sieve bolters, receiving separators, scourers, etc. Write for description and prices. Sprout, Waldron & Co., P. O. Box 429, Muncy, Pa.

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STOP! Look! Listen! The Schlicker non-shock fuse pulling pliers. Indispensable to electricians. Inexpensive to everybody. Indescribably convenient. Insure your feet and hands against shocks and burns. You need it—get one today. Sample $1. Schlicker Mfg. Co., Rochester, N. Y.

GLASS Drills. Improved pattern, rapid cut. Drill glass, china or marble. ¼ inch to 1 inch, $1.00. Gus Lyreman, 1413 Main, Dallas, Tex.

"RED Devil" five inch Combination Plier with Prestolite Opener; insured two years. 50c. Leather case free. Smith & Hemenway Co., Inc., 95B Chambers St., New York City.

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TO buy or sell a machine, write Interstate Machinery Co., Troy, N. Y.

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BARGAIN—Good 12-in. Lathe, compound rest, power feed; countershaft, tools, $115. Storms Co., Asheville, N. C.

FOR Sale: 14"x6' Porter screw-cutting lathe, hollow spindle, clutch countershaft; price, $150.00. J. L. Lucas & Son, Bridgeport, Conn.

ENGINE Lathe, swings 9½ in., takes 25 in. between centers. Complete set gears cutting all size threads 3 in. to 40 in., $48.50. Grammes & Sons, Allentown, Pa.

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FOR Sale—4 cylinder 25 H.P. E.M.F. Automobile engine complete with magneto, carburetor, etc., in first class condition, $75. Also 10 H.P. Mason steam engine, $20. 4½ H.P. Locomobile steam engine, $10. 1423 North Ave., Bridgeport, Conn.

ALTERNATING current rebuilt guaranteed motor bargains. Reliable makes only: General Electric, Westinghouse, Holtzer-Cabot, Fort Wayne, Emerson, Wagner, Western Electric. 1/30 H.P., $7.00; 1/10 H.P., $11.00; ⅛ H.P., $13.00; ⅙ H.P., $15.00; ¼ H.P., $18.00. Many other bargains, including direct current; three phase and larger motors. Moneyworth or Moneyback. Hyre Electric Co., 613 GX South Dearborn St., Chicago.

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REBUILT Engines—We have on hand a number of rebuilt "Buffalo" engines, guaranteed, at greatly reduced prices. Write for bargain list. Buffalo Gasoline Motor Co., 1293-1305 Niagara Street, Buffalo, N. Y.

ONE 4 and one 1 horse-power motor. DC, slow speed. Will exchange for AC or sell. O. M. Scott & Sons Co., Marysville, Ohio.

FOR Sale—A few brand new 5, 8 and 12 H.P. horizontal, water-cooled engines at factory cost. Northwestern Steel & Iron Works, Eau Claire, Wis.

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CASTINGS for small gasoline engines. Mustin Mfg. Co., Newport, Kentucky.

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WATERLESS Washer Soap. Removes grease instantly with or without water. The wonderful mechanics' or time saving soap. For $1.00 we send you enough material to make 16 pounds, prepaid, with instructions. Your money back if not satisfactory. Waterless Washer Laboratories, 1428 Michigan Ave., Chicago, Ill.

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BUILD your own Steel boat from patterns. Material furnished also finished boats. Catalogue free. Darrow Boat Co., Albion, Mich.

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THE Blacksmith. "The Sovereign of all Artisans." King Solomon said they must make the tools for all mechanics. With Toy's Modern Methods doing hard jobs easy, all welds solid, tempering all tools to a standard, colored chart. All for one dollar. Samples free. W. M. Toy, Sidney, O.

ELECTRICAL

ILLUSTRATED wholesale price list; supplies, including sockets, switches, wire, cleats, knobs, rosettes, cutouts. Hyre Electric Co., 613 BA South Dearborn St., Chicago.

200 WATT stepdown transformer, $10. 40 watt dynamo, $7. Inch spark coil, $4. C. M. Adams, Milford, Ohio.

$3.00 TOY Transformers, $1.60. Only a few left. Folders sent free. A. R. Darling, 26 N. Bradley Ave., Indianapolis, Ind.

INVENT Something. It may bring wealth. Free book tells what to invent and how to obtain a patent through our Credit System. Waters & Co. Succeeded by Talbert & Parker, Warder Bldg., Washington, D. C.

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STAMPS, 75, all different, free. Postage 2c. Mention paper. Quaker Stamp Co., Toledo, Ohio.

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WE pay to $80.00 for certain large cents; $5.00 for certain eagle cents, etc. High premiums paid for rare coins to 1912. Many in circulation. Watch your change. Send 4c now. Get our Large Illustrated Coin and Stamp Circular. Numismatic Bank, Dept. H, Fort Worth, Texas.

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MAGIC Acts for sale cheap. We buy, sell, exchange used apparatus. Magic Pocket Trick Free, worth 25c. Illustrated Professional Catalog of 500 parlor and stage tricks, illusions, escapes included; send 6c stamps. Call or write Horman Magic Co., Dept. 10, 470 8th Ave., New York.

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SAFETY Razor Blades sharpened, one cent each, in lots of twenty-five or more; satisfaction guaranteed. E. J. Gibbons, 404 Phila. St., Covington, Kentucky.

SAFETY Razors resharpened the "Keenedge way," two cents each. Satisfaction guaranteed. Stamps unaccepted. Keenedge Company, 500 Greenwood, Fond du Lac, Wisconsin.

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SAFETY razors sharpened; two cents each. Guaranteed. Blade box free. Electro Stropping Co., 134 Shelby St., Detroit, Mich.

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FREE: Guava Jelly. One 50c package free. Carr Brothers, Havana, Cuba.

SAVE Coal and have your house warm when you arise, by installing a Peerless Automatic Draft Regulator. $3.00 Complete. Manufactured by O. K. Landis, 423 Charlotte St., Lancaster, Pa.

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FINEST Quality White Clover Honey, crop of 1916, thirty lb. can $3.60, two or more cans $3.45 each. Sample 10c. Satisfaction guaranteed. Price list free. M. V. Facey, Preston, Minn.

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BUY Diamonds from first hands. We are direct importers and manufacturing jewelers. Established 1873. Prices lowest—comparison invited. Catalogue free. Henry Castelberg, The Diamond King, Baltimore, Maryland.

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Additional Classified Ads Page 38

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Continued from Page 36

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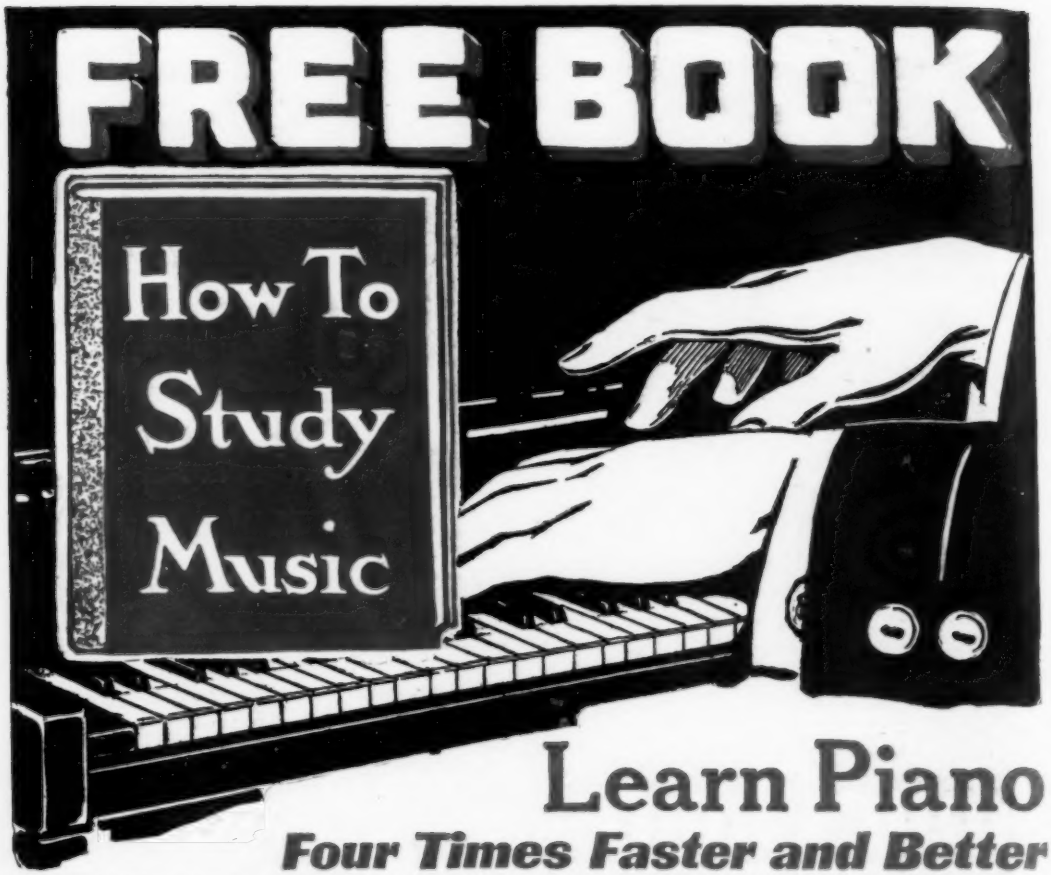

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Who are the best paid among all professional men? LAWYERS. Who occupy the highest positions in business life? LAW-Trained men. Who are our leading executives —Governors of States, Congressmen, Senators, Cabinet Officials? Men with LEGAL training. And why? Because it is now generally recognized that the LAW-Trained man has a keener grasp of affairs and is better able to cope with modern business and civic problems which demand intelligent solution than the man without legal training. Then what profession offers the broadest possibilities for YOU? LAW, of course. LAW has opened the way to positions of honor and profit for more men than any other profession or business. It will do the same for YOU.

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ACT! Enter this success-winning, big-income-producing profession NOW! Today, more than ever before, LAW offers the **shortest route** to the **greatest success** —and with the **least expenditure** of **time** and **money.** Don't remain in the small-job, small-pay class any longer. Begin NOW to build a career of prosperity, power and independence.

Formerly the opportunities to turn a legal education into money were limited to court practice, but today thousands of the choicest places in the field of professional, political and commercial activity are being filled by law-trained men. They are chosen for leadership, because of their grasp of the fundamentals of law; because they know what can be done legally; because their legal training equips them to analyze a proposition and direct and control affairs that cannot be successfully handled by others.

We Train You By MAIL!

at home, in your spare time to acquire a legal training and become a practising lawyer, successful business man, prominent statesman, or to qualify as a Legal Counselor, retained by big institutions, corporations, etc.—or as Attorney-at-Law, deriving a big income from defending and prosecuting law suits.

Our method of Home Training insures your success—first because the LaSalle text is edited and written in plain, easy-to-understand language. Second, because it is prepared by such noted legal educators as James Parker Hall, Dean of University of Chicago Law School; James DeWitt Andrews, former member faculty Northwestern University, and over 20 Law School Deans; Professors in famous resident colleges, and famous legal authorities of Bar and Bench. Third, because we guarantee **to coach free until successful** any graduate failing to pass bar examinations.

Money-Back Guarantee Bond

So thorough is the LaSalle Home Study Course—so exceptional has been the success of LaSalle students—that we issue a legal, binding guarantee to refund the entire tuition fee, if after you complete the Course, you are not perfectly satisfied. This guarantee is backed by our entire capital and resources of more than two million dollars, which assures your absolute success. Don't let the lack of ready money interfere—the total cost of this University Grade Course is surprisingly small, and we make easy payment terms to suit you.

We have successfully trained thousands of men and women in law. Among our graduates are men enjoying positions of honor in political, public and business world. It doesn't matter what your vocation is now, we can help you to the same end. Send coupon for facts that tell how.

Modern Law Library Included FREE

14 massive law volumes—"AMERICAN LAW AND PROCEDURE"—standard size—9½x 6½ inches—bound in ¾ sheep. All branches of Law are fully covered. This work cost us over $50,000.00, but is FURNISHED YOU AT ONCE on your enrollment WITHOUT ADDITIONAL COST.

FREE Complete Course In Public Speaking

Our training by mail, will positively teach you the fine art of persuasive speech. Every Lawyer—every successful man—should be a forceful speaker. Our Course is prepared by Frederick B. Robinson, A. B., A. M., Ph. D., Professor Public Speaking at College of City of New York. Write and learn how you can NOW secure this valuable Course, absolutely free, if you become one of our law students. You owe it to yourself—to your future—to learn all the facts regarding the LaSalle Law Course and how easily you can master it. Mail the coupon and let us send you our two big, illustrated books—valuable "Law Guide" and "Evidence" together with letters from hundreds of our successful law students. Mail coupon NOW.

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Dept. 1264-F Chicago, Ill.
The World's Greatest Extension University

LaSalle Extension University,
Dept. 1264-F Chicago, Illinois

Without obligation on my part, send me by return mail, information concerning your Course in Law with the free books, "Evidence" and Valuable Law Guide—also your offer of FREE Course in Public Speaking to students enrolling now.

Name.....

Address.....

City.....State.....

Come to Akron, Ohio ©
The Tire Center and
LEARN THE TIRE REPAIR BUSINESS

Come to Akron, the heart of the Tire Industry, and learn the business right. No other school or method offers such opportunities. Tire companies need trained men. They co-operate with us and get positions and repair shop locations for our graduates. Repair shops want trained men at big salaries. Opportunities in every town or city to open shops both in business and residence districts. Our graduates are in big demand. Our instructors have grown up with the tire business, know it thoroughly and teach in a clear, concise way. You learn about rubber from the tree to the finished tire and have to repair properly both cord and fabric tires. You get actual experience repairing every kind of tire. Thousands of men running repair shops of their own.

EARN $2500 TO $10,000 A YEAR!

Many shops make up to $20,000.00 a year. There are hundreds of good shop locations in every state where men can earn $2500 to $7500 or more **a year** easily and **Be Independent.** Tire factories and repair shops pay from $3.00 to $5.00 a day and work is steady the year round. There are **three and a quarter million** autos in use. Every car has four tires besides the spare tires. Think of the repairs needed on these millions of tires. The profits on the repairs is big and the work is done quickly by our graduates. We have arrangements with the big factories to find best shop locations for our graduates. There are 65,000 tire dealers and only 13,000 repair shops in the whole United States. Think of your chances to make money. Will you stay in a "rut" or get started in this big money business? Course is easy to learn and you graduate in 4 to 6 weeks. Every graduate gets a life membership.

Write for literature NOW, or better still, jump on the train and come to Akron. Don't delay. Get into this BIG PROFIT BUSINESS.

GRADUATE COMPLETELY SATISFIED

Detroit, Mich., October 14th, 1916.

Akron Tire Repair School, Akron, Ohio.

Gentlemen: I had intended writing you sometime ago in regard to your school, from a graduate's viewpoint. I must say that you certainly have fulfilled your agreement to the letter, and I don't think I need to elaborate any on the subject, which I think will be completely covered when I say that I am **fully** satisfied. The clear, concise instruction and the carefully superintended practice which I had in your excellently equipped place, will be of great value to me when I open up my own repair shop. I think that many tire-repair men already in the business could save themselves money by taking your course, that section which deals with cord tires being alone worth the time spent. The benefits derived therefrom would remain long after the cost in money and time had been forgotten. As it may be some time before I go into the business, I intend to return to your school for a couple of weeks or so to brush up. This privilege of returning at any time I consider to be by no means the least in connection with your school. With best wishes for your success, I remain,

Yours sincerely, ALEXANDER M. DUNCAN.

MONEY-BACK GUARANTEE

We guarantee to qualify our students to go into business for themselves or to hold positions paying $18.00 to $40.00 weekly or return their money.

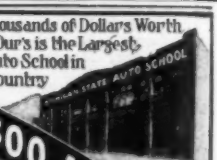
AKRON, OHIO
THE HEART OF THE TIRE INDUSTRY

MORE THAN 8,000,000 TIRES ANNUALLY

Akron Tire Repair School 72 Tire Bldg. 46-48 Main St. **Akron, Ohio**
A. G. Zeller, President *The Largest and Best Equipped Exclusive Tire Repair School*

Come to Detroit
The Automobile Center and
LEARN THE AUTOMOBILE BUSINESS - EARN $75. TO $300. A MONTH

With the New Building and Thousands of Dollars Worth of New Equipment, Our's is the Largest Exclusive Auto School in the Country

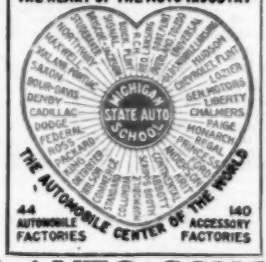


In a recent issue of "The Automobile," one of the reliable automobile trade papers, the editors had compiled statistics showing that 79% of the automobiles made in America are made in Michigan, 15% in Ohio, 2% in Indiana and 4% elsewhere. Approximately 60% of the total output is made in Detroit, and about 94% is made within 200 miles of Detroit. These figures are from a reliable source and prove conclusively that Detroit *is* "The Heart of the Auto Industry." The Michigan State Auto School is in the very heart of the greatest auto activities and is a pioneer in the auto school field. The biggest men in the auto business are giving us the very keenest cooperation. This is a big help to our students and graduates.

Biggest Opportunities Are Found in Detroit at the
MICHIGAN STATE AUTO SCHOOL

The Employment Managers of the Big Auto factories are glad to get our graduates and pay them well. They give them good positions. Garages and service stations are constantly calling for Michigan State Auto School (Detroit trained) men. They know from past experience that we teach men correctly. Every student is given a clear, concise and thoroughly practical training. That is the Michigan State Auto School way made possible by the factory cooperation here in "The Heart of the Auto Industry." Remember this is the pioneer school, it has blazed the way to sure success, our students profit by this vast experience. Don't wait but come now.

DETROIT
THE HEART OF THE AUTO INDUSTRY



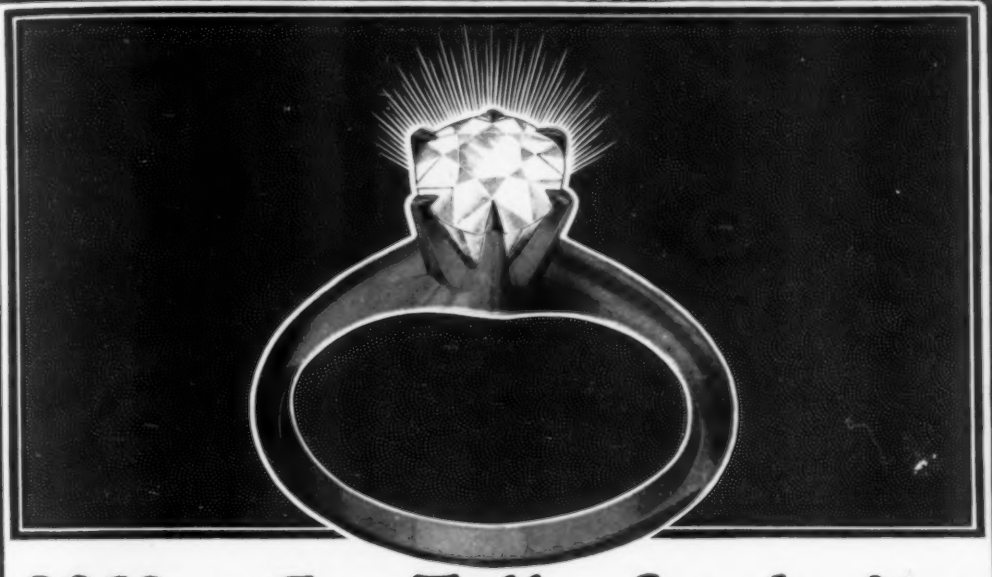
44 AUTOMOBILE FACTORIES — 140 ACCESSORY FACTORIES

Hundreds of our students and graduates take our course with the express purpose of going into business for themselves. Our school in "The Heart of the Auto Industry" gives them the opportunity to get right at the factory whose car they want to sell, they can meet the men in the sales and service departments, they can work in the factory for a time. This is an important feature offered by us only. No matter whether you want a good position or intend going into business the Michigan State Auto School, in Detroit, "The Heart of the Auto Industry," offers the best training.

Read Carefully pages 46 and 47 —Then decide

MICHIGAN STATE AUTO SCHOOL THE OLD RELIABLE SCHOOL A. G. ZELLER, President
312 Auto Bldg., 687-89-91 Woodward Ave., and 11-19 Selden Ave., DETROIT, MICH.

Please Mention Popular Mechanics



If You Can Tell a Lachnite from a Diamond-*Send it back*

YES, we'll send you one of these exquisite man-made gems and you can wear it for 10 full days at our expense. Put it to every diamond test you ever heard about—fire—acid—diamond file. **Compare its brilliance with the brilliance of a mined diamond.** Notice how it is cut—by world renowned diamond cutters. Test it in every way. Wear it everywhere you go. Then after ten days—if you are able to tell which is your Lachnite and which is your diamond—or if any of your friends have been able to tell the difference—send the Lachnite back to us. **The trial does not cost you a penny.** If you decide to buy the Lachnite, pay only the rock-bottom price, and if you wish—at a rate of a few cents a day. Our new jewelry book (sent free) tells about our generous terms. Send the coupon for it today. You will be delighted.

Set Only in Solid Gold

Lachnite Gems are mounted only in solid gold. To hold these splendid jewels we have secured the latest and newest ideas in solid gold settings. In our new catalog you will see illustrated rings by the score for both men and women—bracelets, La Vallieres, stick pins, cuff links—all the newest jewelry—made of solid gold. Write for our new catalog today. It's free—and it has a message for you.

Pay As You Wish

Do not decide to buy a genuine Lachnite Gem until you have worn it for ten full days. Then—if you wish—you may pay for it at the rate of only a few cents a day. **Terms as low as 3½ cents a day—no interest.** You don't pay for trial. No red tape; your credit is good.

Send the Coupon For Our New Catalog!

Put your name and address in coupon or on a postcard and get our new jewelry book. It shows handsome illustrations of newest solid gold mountings from which you have to choose. Too—it tells the interesting story of how Lachnites are made—and why their brilliance is guaranteed to wear forever. Send coupon for it today—it is free—no obligation.

Harold Lachman Co. 12 N. Michigan Ave. Dept. 1199 CHICAGO

Harold Lachman Co.
12 No. Michigan Avenue, Dept. 1199 Chicago, Ill.

Gentlemen: Please send me, absolutely free and prepaid, your new Jewelry Book and full particulars of your free trial, easy payment plan. I assume no obligations.

Name.....

Address.....

33,000 sq.ft.of Additional Floor Space

Come to Detroit
The Automobile Center and
LEARN THE AUTOMOBILE BUSINESS

DETROIT trained men get preference and get jobs quickly. No other city can give what Detroit offers. Think what it means to learn in the Michigan State Auto School. Factories endorse our school, glad to employ our graduates or offer them territory in which to sell cars and start garages. Unlimited opportunities. You're right in the middle of the greatest auto activities. Men are needed everywhere as testers, repair men, chauffeurs, garage men, and service men. Hundreds of our graduates start in business for themselves.

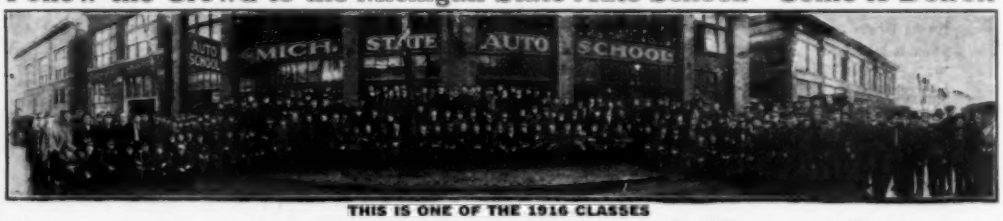
Get Better Job—or Go In Business

We teach you to handle any auto proposition. You graduate in from eight to twelve weeks. **Our equipment is complete.** Students actually build cars from start to finish, getting factory training in assembling, block-testing, road-testing, everything. Special complete course in Oxy-Acetylene brazing, welding and cutting separate from regular course. All leading types of starting, lighting and ignition systems in operation. Learn to time motors, adjust carburetors, magnetos, valves and bearings quickly and accurately. Six-cylinder Lozier, Chalmers "6," Detroiter "6," Overland, and 8-cylinder King are used for road instruction. We have a new Chalmers "6-30" chassis with 3400-r. p. m. motor, the latest thing out, Willys-Knight 1917 chassis, Saxon "6" 1917 chassis, Studebaker "6" 1917 chassis, Maxwell 1917 chassis, Hudson Super-Six 1917 chassis, Oldsmobile "8" 1917 chassis, Cole "8" 1917 chassis, Briscoe 1917 chassis, Detroit Electric 1917 chassis. These chasses are completely equipped and are for students to work on. Delco System as used in Buick, Hudson, and Packard Twin "Six."

Detroit Is the Place to Learn—Start Any Time

There are 44 auto factories in Detroit, and 140 accessory and parts factories. Our students have the privilege of going thru any or all of them. We now **operate Westinghouse Auto-Lite and Bijur Service Stations.** After careful consideration the Westinghouse Electrical & Mfg. Company, the Auto-Lite Company and the Bijur Co. decided that our school was the best place in Detroit to handle their service stations. This has added thousands of dollars worth of equipment and makes our electrical department unequaled. Students get actual experience and training in handling all kinds of electrical auto equipment and taking care of trouble. We have just installed a Sprague Electric Dynamometer for block-testing purposes for students' use. Auto factories need Dynamometer men constantly. Factories and Garages are paying big salaries to men who **know** how to handle electrical equipment quickly and properly. Detroit is the automobile center. Come to our school and learn the auto business right. You get practical instruction. School open all the year. Enter classes any time, any day. Three classes daily: morning, afternoon, evening. You can work in the factory in the day time and take course at night. There is a great demand for Michigan State Auto School students.

Follow the Crowd to the Michigan State Auto School. Come to Detroit



THIS IS ONE OF THE 1916 CLASSES

Factory Co-Operation

We have completed arrangements with the Auto factories to put them in touch with men who intend going into business for themselves. Think of getting inside information as to the best territory and where the garages will make the most money. The factories are looking for trained men to represent them. Men who know the auto business from A to Z are in biggest demand. Come here and start right—get the information first-handed and don't wait.

Act Quickly — Now — DON'T WAIT

Write to us now, get full particulars and "Auto School News" and New Catalog. They are both absolutely free. Or better still, jump on the train, as hundreds have done, and come to Detroit, the "Heart of the Automobile Industry," and learn right.

Additional Building and Equipment

33,000 sq. ft. of additional floor space in our new building, thousands of dollars worth of new equipment, plenty of room for students to work. This comes with our new building at 687-89-91 Woodward Ave. Our school has grown by leaps and bounds, students come from all over the world. Men have left after graduating and started business for themselves; others have accepted good jobs both in Detroit and over the country. Their work has proven that we train them rightly. We are constantly adding new equipment. Our students get the best and latest things to work on. Our electrical department is thorough and complete. It is in charge of the most competent electrical instructors.

Remember, you can enter classes any time, any day. The price of course is based on giving full value. Therefore we cannot give another course free. Graduates in the complete auto course are competent to handle farm tractors. Act quickly—now. We have no branches. Write or come direct to this school.

SEND THIS COUPON TODAY

Michigan State Auto School
687-89-91 Woodward Ave.—11-19 Selden Ave.
312 Auto Bldg., Detroit, Mich. U. S. A.

Gentlemen: Send me absolutely FREE "Auto School News," and New Catalog or better still you can expect me about.....

Name.....

Street.....

Town.....State.....

33,000 sq. ft. of additional floor space

MICHIGAN STATE AUTO SCHOOL

The Old Reliable School
A. G. ZELLER, President

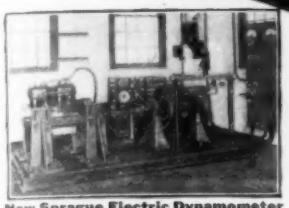
687-89-91 Woodward Ave.—11-19 Selden Ave.
312 Auto Bldg., DETROIT, MICH, U. S. A.

Money-Back Guarantee

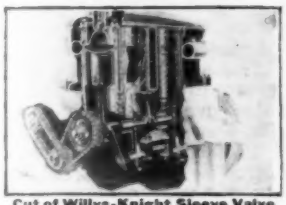
We guarantee to qualify you in a short time for a position as chauffeur, repair man, salesman, tester, demonstrator, garage man or automobile dealer, paying from $75 to $300 monthly, or refund your money. We have constantly more requests for Michigan State Auto School Graduates than we can supply.

With the New Building and Thousands of Dollars Worth of New Equipment, Our's is the Largest Exclusive Auto School in the Country

EARN $75. TO $300. A MONTH



New Sprague Electric Dynamometer —just installed



Cut of Willys-Knight Sleeve Valve Noiseless Motor

Partial View of Electrical Equipment

Corner of Block Testing Department

Section of Rear Axle and Transmission Department

Students Have Completely Equipped Cars to Work On

Here's the PROOF— Think It Over Carefully

Chalmers Motor Company

Detroit, Mich., U. S. A., July 26, 1916.
Mr. A. G. Zeller, Pres., Michigan State Auto School, 11 Selden Ave., Detroit, Mich.

Dear Sir: We are very well pleased with the men in our employ who are graduates of your school and my object in writing to you now is to find out if you cannot furnish us with all classes of help. There are, no doubt, some men who wish to go to your school that have had no experience at all and we are in a position to give these men employment. We have openings at various times for inexperienced men and we find that men who have the energy to school themselves are the class of men who will stick on the job, so I will be pleased to take any men that you can send us and will keep you posted as to our wants. We can always use your graduates and our experience teaches us that they are the class of men that we want. Very truly yours, CHALMERS MOTOR COMPANY. Signed, Fred H. Smith, Supervisor Employment

Hudson Motor Car Co.

Detroit, Mich., U. S. A., August 25, 1914.
Mr. Wm. I. Shumpert, Mooreville, Miss.

Dear Sir: Answering yours of August 22. We believe the Michigan State Automobile School of this city is of good standing and capable of rendering the necessary instructions. Offhanded, I do not know whether they maintain a class for the instructing of salesmen. Trusting the above information is what you desire, we remain. Yours very truly, HUDSON MOTOR CAR COMPANY. Signed, D. G. Small, Service Department, Technical Division.

Detroiter Motor Car Co.

December 14, 1915.
Mr. Harry S. Walker, Brooklyn, New York.

Dear Sir: I have your letter of recent date, asking us what we know of the Michigan State Automobile School. In reply, would state that this school, in my opinion, is the best automobile school in the country, being located in the heart of the automobile industry; having not only the facilities of all the factories at its disposal, but a very complete equipment of their own, and a very able staff of instructors. They are not only strong financially, but their moral obligations are equally as strong, and in my opinion, if you are considering going into the automobile business, a course of instruction in this school would fit you for any department of the automobile trade you may wish to enter. Any further information will be gladly given. Yours truly, Signed, A. O. Dunk, President, DETROITER MOTOR CAR COMPANY.

Maxwell Motor Sales Corporation

Detroit, Mich., May 27th, 1916.
Mr. Chester Motsinger, Wallburg, N. C.

Dear Sir: Replying to your letter of May 23rd, regarding a course in the Michigan State Auto School. From what we have been able to learn regarding this school, they are in a position to give you a very thorough course of training in automobile construction and repair. They have a great many different models and are able to give their students a good course of instruction. Yours very truly, MAXWELL MOTOR SALES CORPORATION. Signed, F. B. Whitcomb, Service Executive Department.

Paige-Detroit Motor Car Company

Detroit, Mich., U. S. A., Dec. 15, 1915.
Michigan State Auto School, 11 Selden Ave., Detroit, Mich.

Gentlemen: Mr. Jos. W. Barnett, of Crossett, Ark., has written us stating that he intends taking up the automobile business and would like us to give him information concerning your school. We have, of course, written him commending your institution, and suggest that it would be well for you to get in touch with the gentleman. Very truly yours, PAIGE-DETROIT MOTOR CAR CO. Signed, H. H. Scofield, Assistant to Sales Manager.

MICHIGAN STATE AUTO SCHOOL

The Old Reliable School

A. G. Zeller, President
687-89-91 Woodward Ave.
11-19 Selden Ave.
312 Auto Bldg., Detroit, Mich., U.S.A.

Each year more automobiles are made. Nearly 1,250,000 cars were put in the hands of the users from Jan. 1st, 1916, to Sept. 1st, 1916. More garages are needed now. Trained Auto men are in greatest demand. Michigan State Auto School graduates have no trouble getting good jobs in Detroit and over the country. Detroit is "the Heart of the Auto Industry." Factories are co-operating with us in every way, they cannot get enough trained men. Detroit is the best place to learn. Our school gives thoroughly practical instructions.

Our School a Pioneer

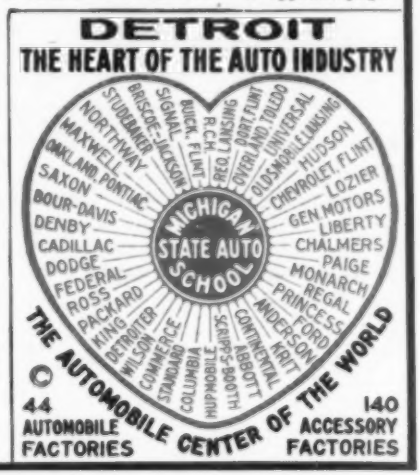
Our school, being in the "Heart of the Auto Industry," has been a pioneer—we have set the standard in the Auto school business—we have blazed the way—we have established a standard of thoroughly practical teaching which has often been imitated but never equalled—being in close touch with the biggest, strongest automobile factories, we will continue to be pioneers—for we have so thoroughly established ourselves with these big factories that they come to us first—they thoroughly appreciate what it means to get their cars before our thousands of students and graduates. The men who are thinking of taking an Auto course of training are coming to our school by the hundreds—they soon discover when they arrive that they have made the right choice—**better follow their examples.**

Adding New Equipment

We have more than 25 motors in our block test department—2 cyl., 4 cyl., 6 cyl., 8 cyl., and 12 cyl. Our electrical department is complete, having every standard starting, lighting, and ignition system.

Act NOW

Use the coupon on opposite page



FREE!

Yes, I mean just exactly what I say — that I will give you this magnificent set of Imported German Silver Draftsman's Drawing Instruments positively and absolutely free. And besides the instruments in this beautiful plush lined leather case, I will **also** give you absolutely **free** a 20 x 25 inch drawing board, a 24 inch T square, a 12 inch rule, two triangles, a French curve, two bottles of drawing ink, a supply of paper, pencils, erasers, thumb tacks, etc., etc.—a complete draftsman's working outfit, the very same kind that I use myself.

This superb set is valued at $17.50. It goes absolutely free to those who get my personal instructions in Draftsmanship.

I Will Train You By Mail

I am Chief Engineer of a large firm. **Draftsmanship** brought me to my position. I know just the kind of training you need to get a big salary. I will give you personal instruction by mail — instruction based on my own every day practical experience. You need no special talent or requirements. You do not have to take a minute from your regular work. No matter who you are or where you live, if you can read and write and are ambitious I will take you in hand and make a real draftsman out of you. Write for my free book and see what I have done for others. Send the coupon or postcard.

Become A Draftsman

The need **now** is for draftsmen! Companies everywhere are looking for skilled draftsmen to fill positions paying from $125.00 to $300.00 per month. The work is light, pleasant and profitable. Look at the want ads of our metropolitan newspapers and see for yourself what an urgent demand there is for draftsmen. This is the "**Construction Age**"—the epoch of a new pace in every field of industrial endeavor. The services of the draftsman are needed more than ever before. Give me a few minutes of your spare time for a few months and I will qualify you for a big salary and a real future.

MAIL COUPON TODAY

CHIEF ENGINEER COOKE
Dept. 1Y, 455 Cass St., Chicago, Ill.

Without obligation or cost to me send prepaid your free book "The Road to Success" and particulars of your very extra special offer.

NAME.....

ADDRESS.....

Take Your Time To Pay Me

Let me count on you as an earnest student and you won't have to bother about the money question. I'll help you take care of that. To secure the quick enrollment of a few more ambitious men I'll cut my tuition price to an extremely small figure and give the privilege of paying this small cost on terms so easy that you'll scarcely miss the money. Remember, you get the draftsman's outfit **free**, so that you can start in right away. Send the coupon for my amazing free book and full particulars of my special offer.

CHIEF ENGINEER COOKE
CHICAGO ENGINEERING WORKS, Dept. 1Y, 455 Cass St., CHICAGO, ILL.

Control the Cash Register of a Billion Dollar Business!

MEN ARE NEEDED to watch the profits of the Electrical Industry. These men must be trained—and if they are, big salaries will be paid to them. Electricity cannot be sold over the counter like ordinary merchandise. It must be measured by delicate meters—and the men who know meters and their operation are in big demand.

Big Salaries Must Be Paid

The Electrical Industry cannot afford to risk the care of its meters to untrained men. They pay big money to the men who know. These men must direct the staff of meter men—they rule supreme over the profits of a billion dollar business. No wonder their salaries are large. No wonder $150 a month is ordinary.

Men Are Needed

Trained men are needed this very hour to guard the profits of the Electrical Industry. Meter Engineers—the men who know the science of electrical measuring instruments—are in big demand all over America. And you can qualify yourself to fill one of these positions. Just the kind of training you need may be yours right in your own home and, by spending a few hours in pleasant reading and experiment, fit yourself for one of these big jobs. Write at once—now.

Send the Coupon!

Put your name and address on the coupon, or on a letter or a post card now and get our new book on Electrical Meter Engineering absolutely free. Find out about the opportunities that await you. Find out how you can get this training right in your own home during your spare time. The book is free. No obligations. Write for it today. Opportunity is calling you and saying "Send the coupon."

Fort Wayne Correspondence School
Dept. 1199 — Fort Wayne, Ind.

Fort Wayne Correspondence School
Dept. 1199, Fort Wayne, Ind.

Gentlemen: Please send me your new book on Electrical Meter Engineering, absolutely free and prepaid. Also tell me how I can fit myself to "control the cash register of a billion dollar business." It is distinctly understood that I am under no obligations.

Name.....

Address.....

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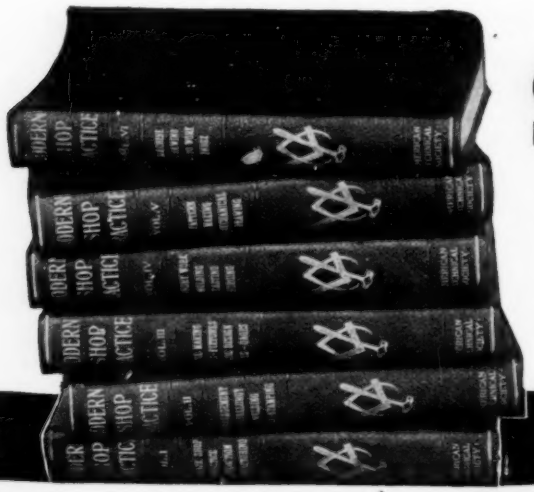

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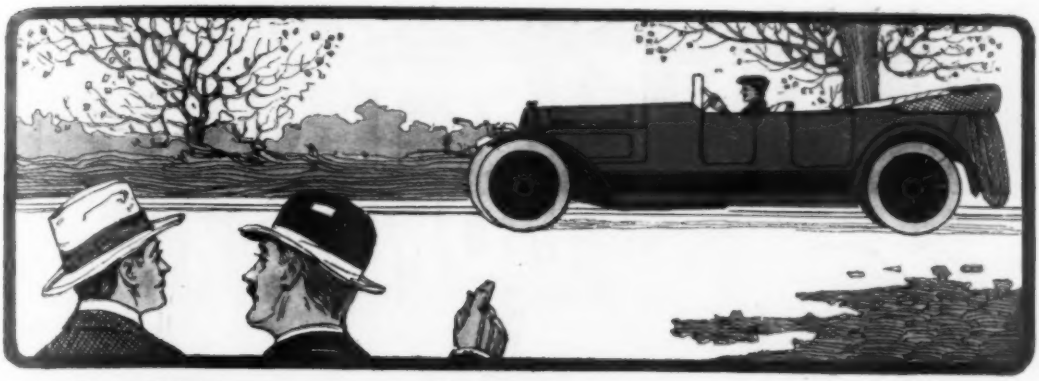

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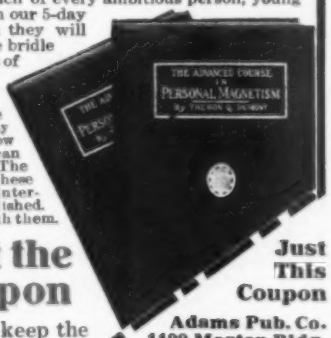

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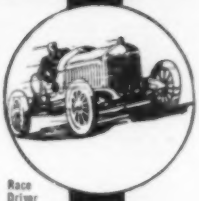
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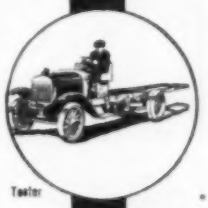
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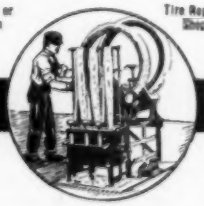
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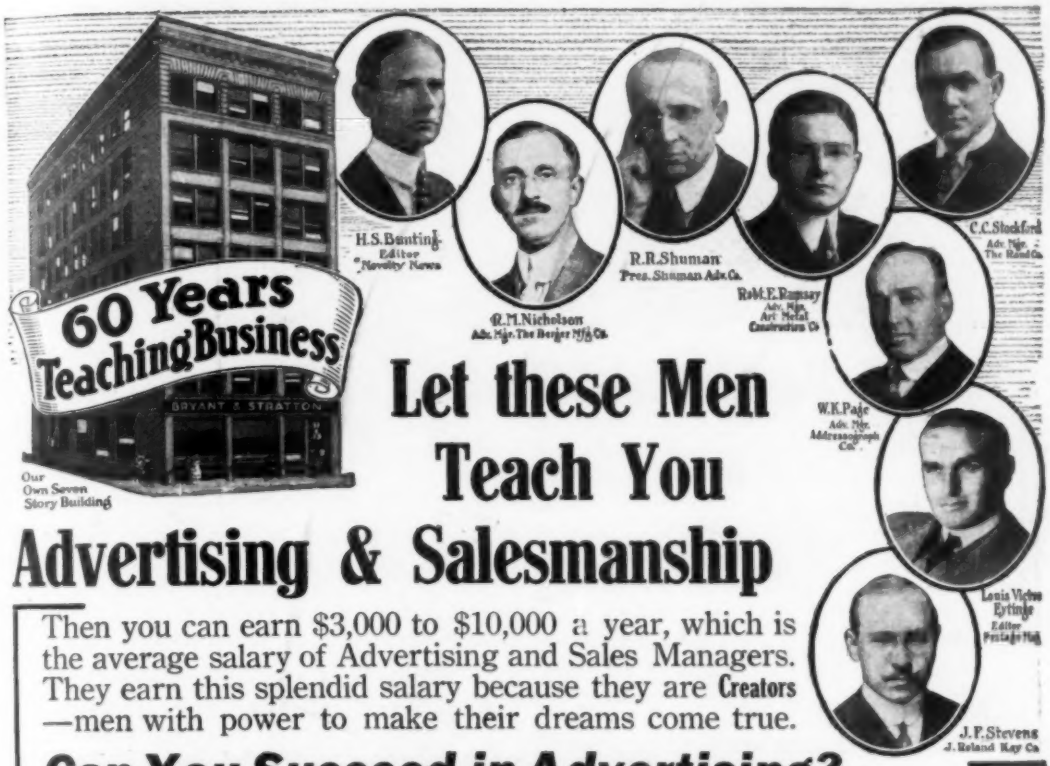

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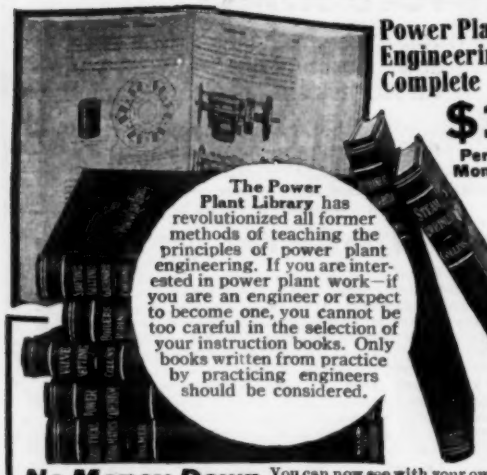

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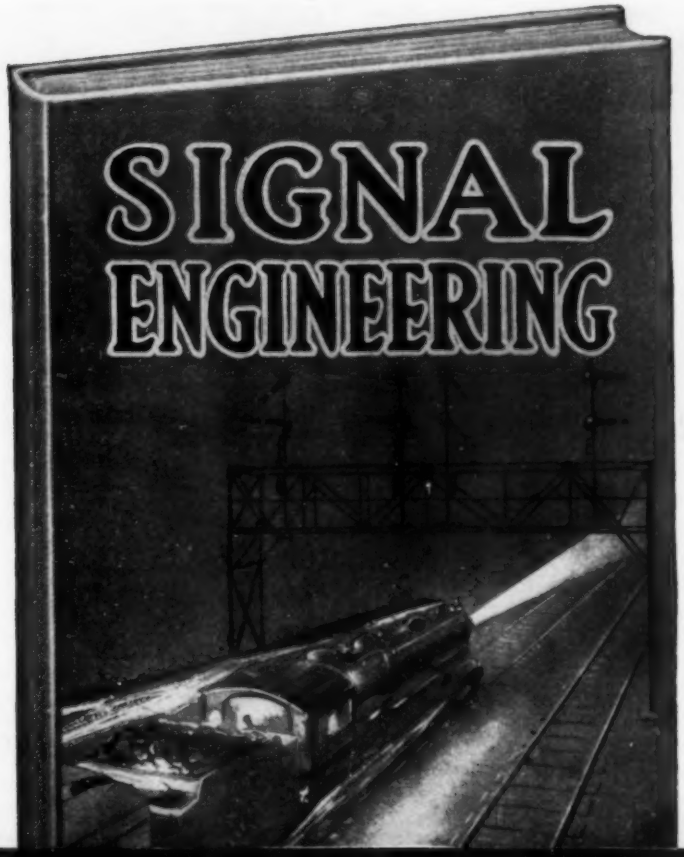

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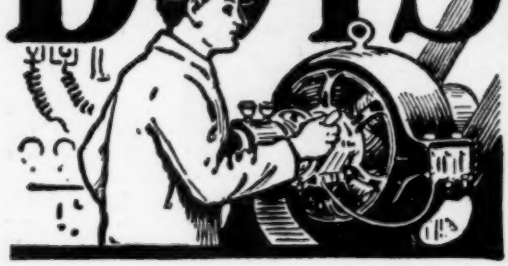

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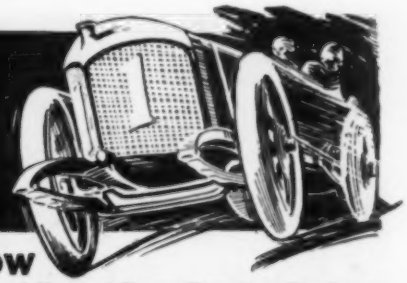

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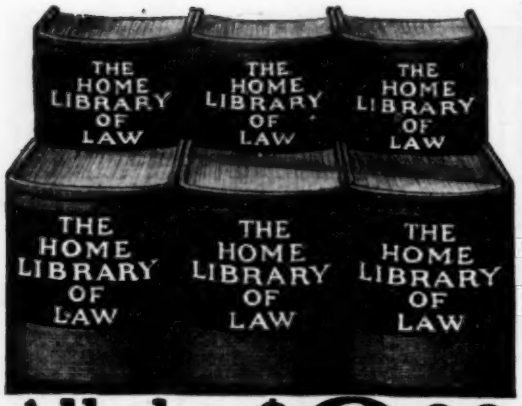

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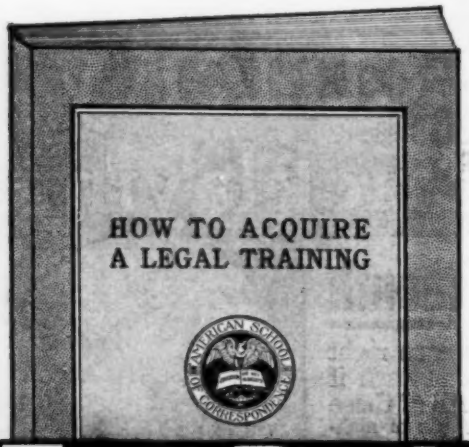

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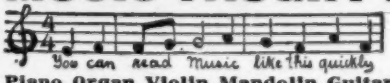

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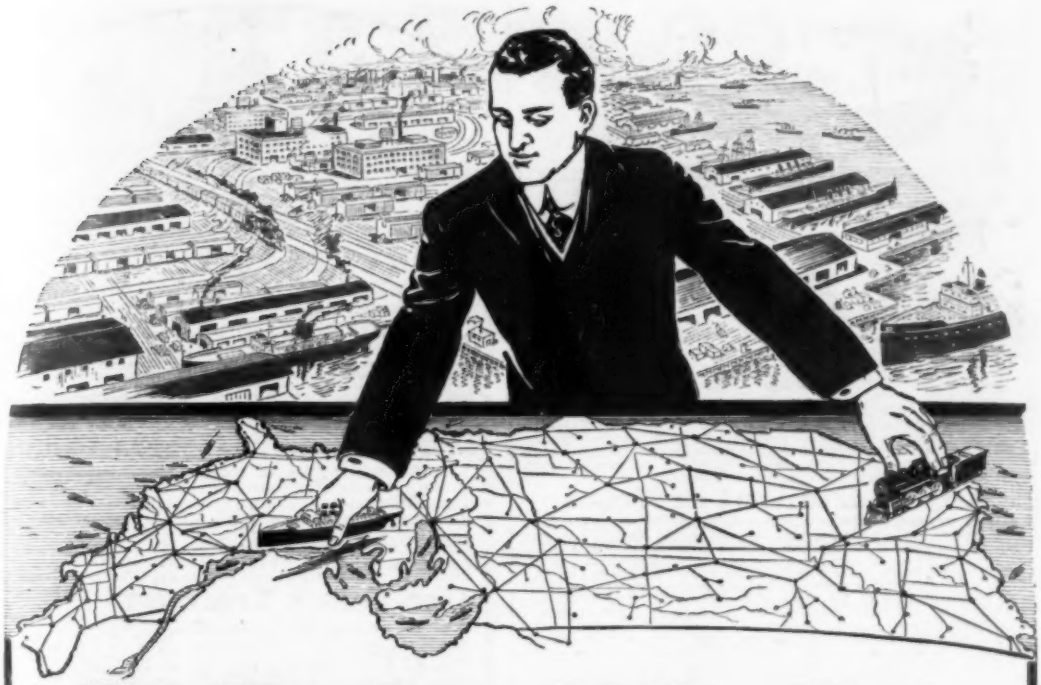

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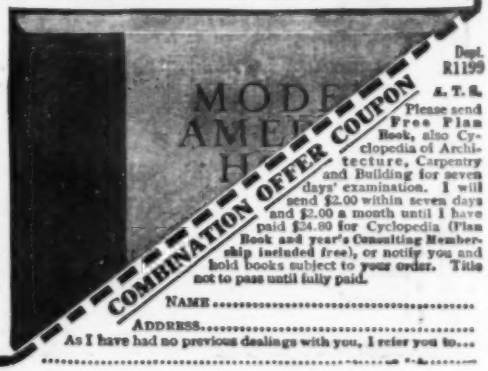

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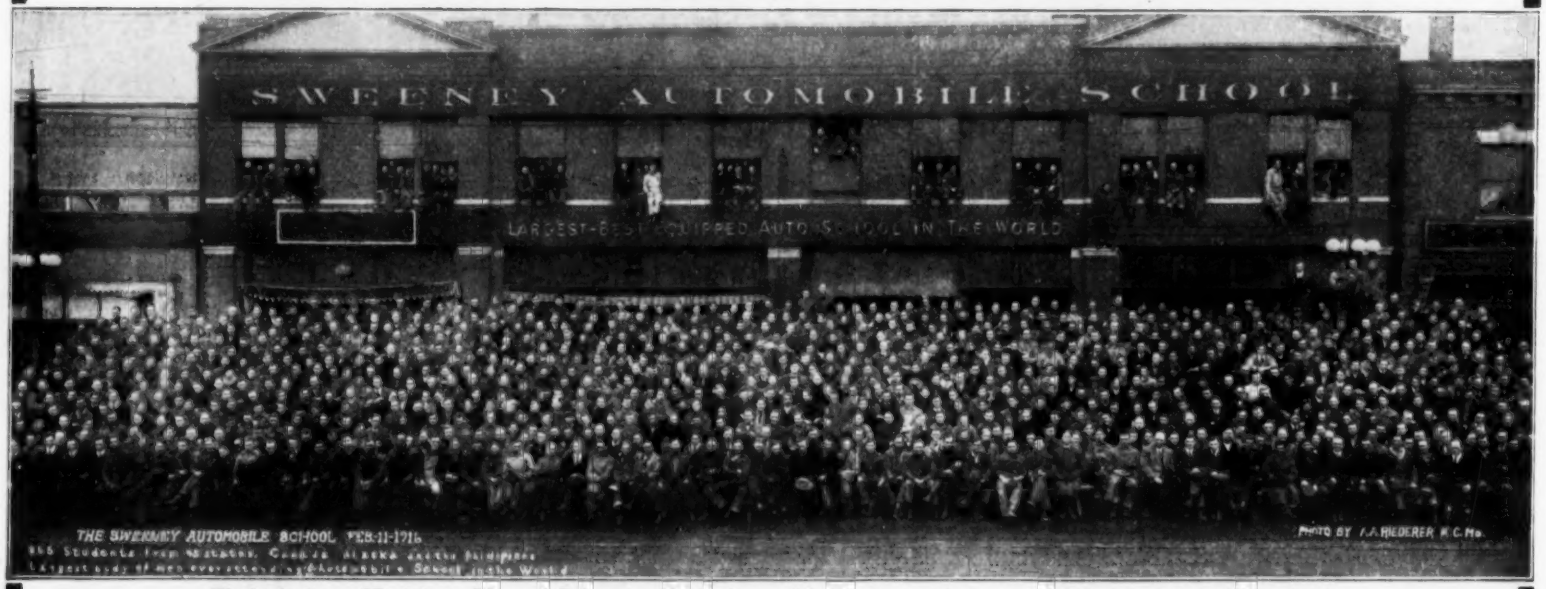

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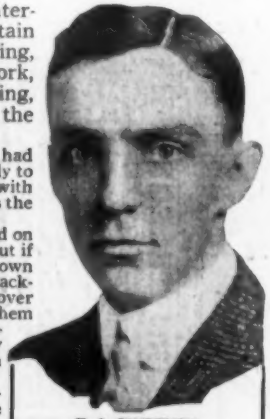

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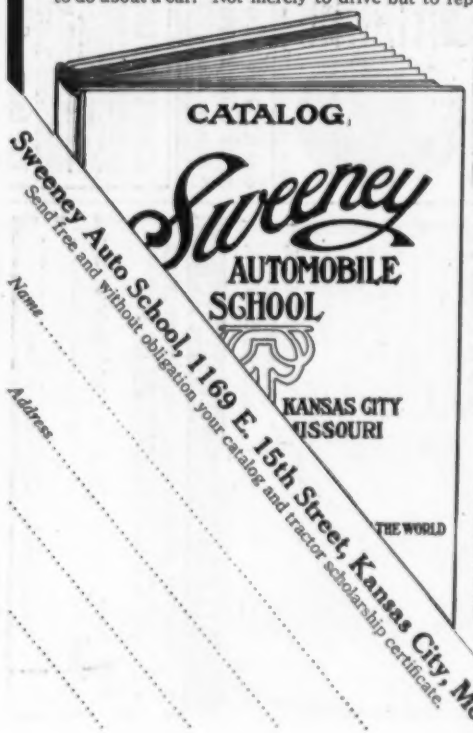

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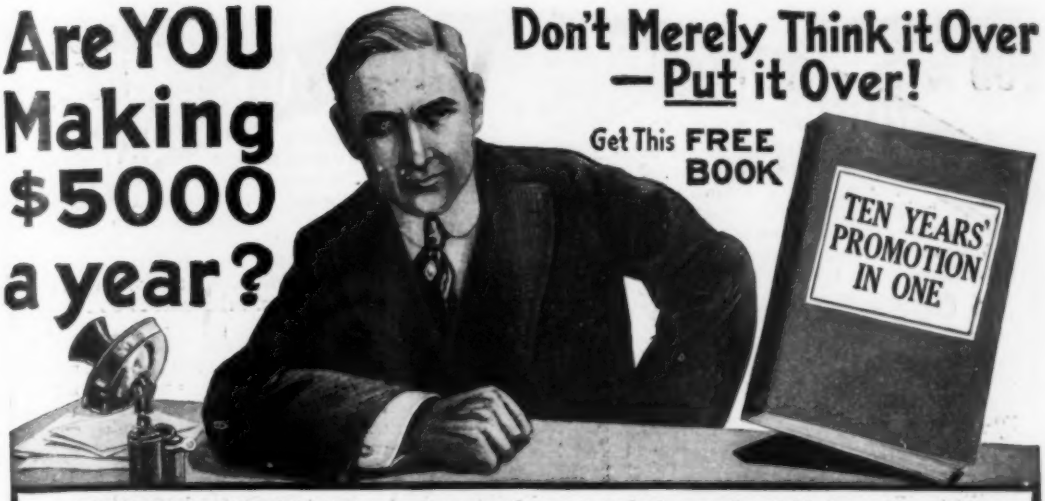

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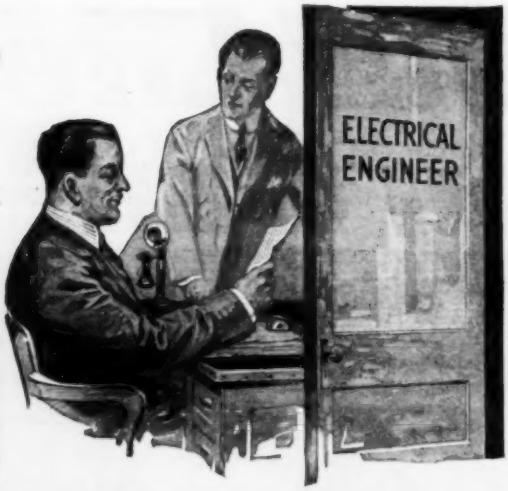

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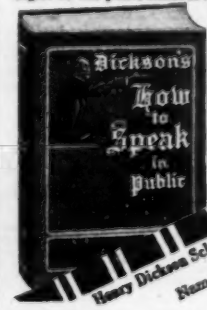

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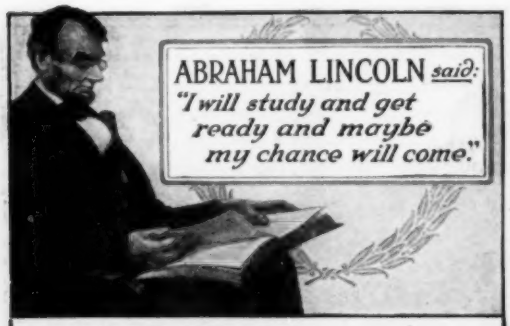

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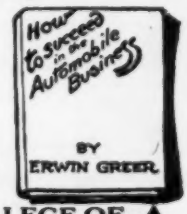

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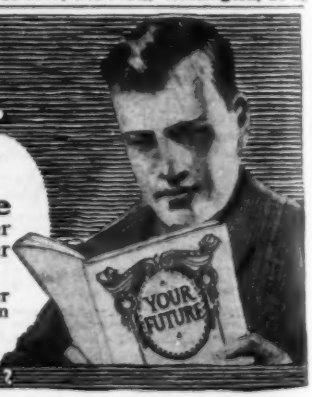

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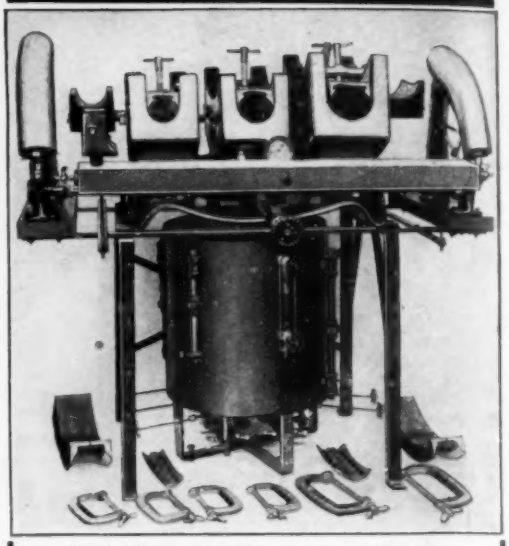

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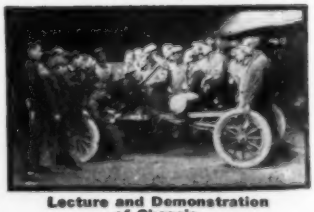
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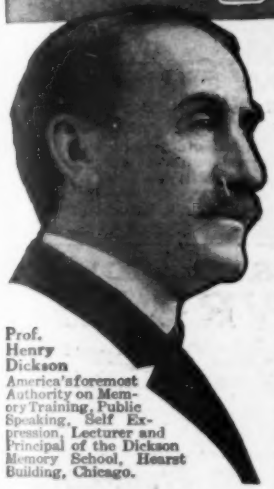

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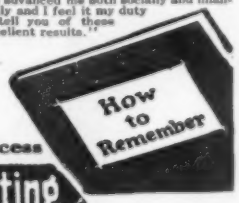

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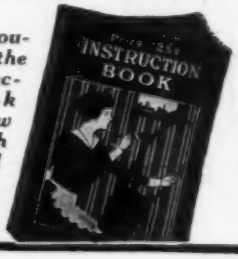

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$497 for this Complete ALADDIN Bungalow

Contains Living Room, Dining Room, Kitchen, Two Bedrooms, Closet

Saved $600 on Dealer's Price

"I saved in round numbers $350 and I have the estimates from several different lumber concerns and contractors to support my figures," writes Mr. G. E. Farmer, of Iowa, owner of the Aladdin Maples bungalow shown above.

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In every case Aladdin Houses saved the builder from $200 to $800. Saved him a third of the time of erection, as Aladdin lumber is cut to fit—no sawing, no cutting—no fitting. Better, cleaner and heavier lumber. Better and purer paints. Better and more costly hardware, ample quantities of nails in all sizes, better lath, highest quality of hard wall plaster. And all this for less than the price of regular, cheaper stock usually furnished. But, don't stop here. Get the big Aladdin catalog of 100 homes. See the beautiful homes, excellent plans. Write to Aladdin customers. Get the complete story in their own words. Send stamps for the Aladdin catalog today.

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Why should you pay the dealer's price for ordinary quality of lumber when you get the best obtainable—Aladdin lumber—at a saving? Aladdin lumber is the finest that grows. It is the choicest from the log. The best is taken for Aladdin Houses and the second quality is not used by us. That's why we can offer you the Dollar-a-Knot guarantee. Where else can you get lumber equal to Aladdin quality and at Aladdin's price?

$298 for this 5-Room Home

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Complete House—Better Material—at a Saving of One-Third

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Homebuilders to the Nation

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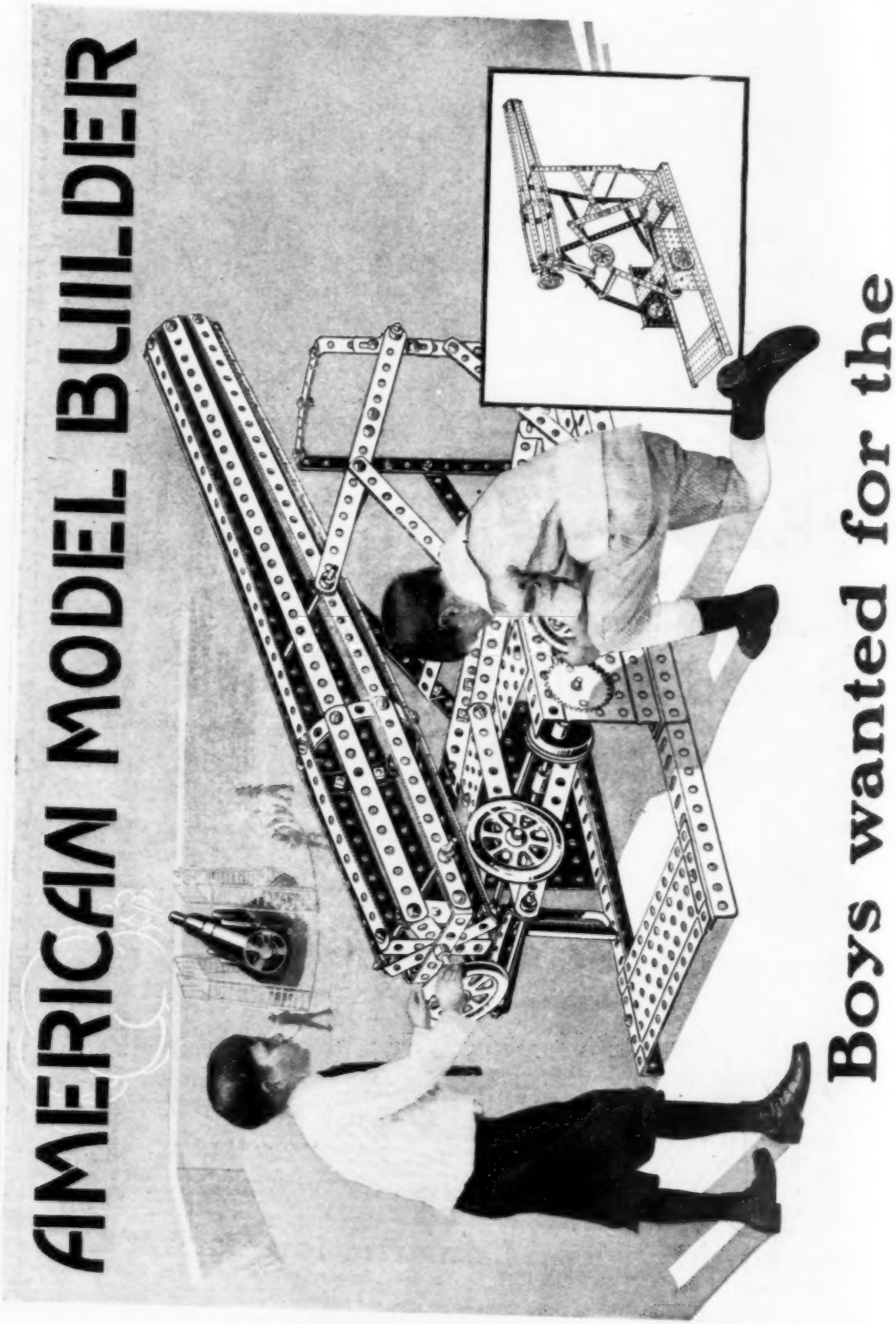

AMERICAN MODEL BUILDER
Boys wanted for the

"American Army"

Good pay in lots of fun—Excellent mental training—Recruiting stations at stores in your town

Thousands upon thousands of boys everywhere have already listed under the victorious banner of the American Model Builder

The army camps on the Field of Fun recruited not to fight, but to *build*.

"Armed" with an American Model Builder outfit, each boy makes thrilling conquests not in destruction, but in *construction*.

He builds all the things that great engineers build—

—big disappearing guns, like the one shown above; warships, aeroplanes; hoist bridges, traveling cranes; stationary engines; derricks; automobiles; printing presses; elevators; and hundreds of other models that *really operate*.

Join the ranks of the American Model Builders, fellows! It's bully fun! Tell Dad tonight that you want to enlist with the "army" Christmas morning.

Tell him, also, that the American Model Builder is—

The greatest of all values in construction toys

—because it contains 15% *more* new and novel parts than any other outfit, such as real automobile wheels, car wheels, truck frames, bolster plates, "T" strips, ratchet pawls, new gears and angle irons.

—because you can build *more* practical working models, models that go through all the operations of the real machines. And that's half the fun, fellows—running the models after you build 'em!

—because the American Model Builder is *built to last*. It contains not a single piece of flimsy wood, tin or iron. Every part is made of the highest-grade brass and cold-rolled steel, double-plated.

—and because a real electric motor, as explained in the panel to the right, is included with sets at $2 and up.

Look Fellows!

Electric motor included with sets at $2 and up

Not a toy, but a real motor that will operate the models you build with your American Model Builder outfit. It has three-pole armature, spring tension brushes, form wound coils, stands 3⅛" high by 2¼" over shaft, has start, stop and reverse switch. Can be operated on dry cells or on city current through our inexpensive transformer.

Fathers and Mothers

Here is the toy your boy *needs*. The American Model Builder contains all the major parts used in modern engineering and is based on correct mechanical principles. It will teach your boy to *think constructively*, fostering his inventive and creative genius. It will keep him *quietly* amused for hours.

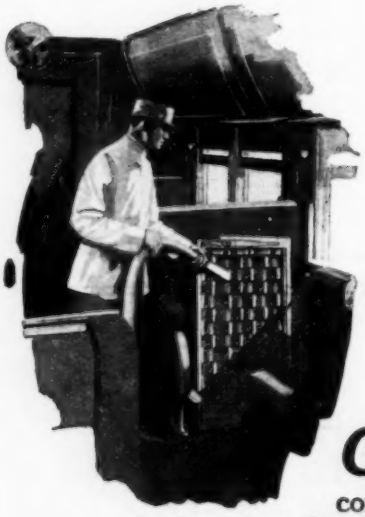
Ask Your Dealer

to show you the new sets of the American Model Builder and the new instruction book containing dozens of new models never before built with a construction set. He will also give you a booklet showing the new features. If your dealer hasn't the genuine American Model Builder write us and we will send catalog and full information with name of dealer who can supply you.

The American Mechanical Toy Co.

312 First Street, Dayton, Ohio

Get in the Big Prize Contest for new models. 155 prizes valued up to $100 each. Write us for details.



An Advertisement by
THE PULLMAN COMPANY

Cleanliness. To maintain in a condition of absolute cleanliness the large number of cars, constantly in operation in every part of the country under conditions of dust and dirt unavoidable in railroad operation and annually accommodating approximately twenty-five million passengers, requires an elaborate organization trained by years of experience and maintained at a large annual expenditure.

The modern Pullman car contains everything essential to cleanliness and sanitation which the best experts upon these subjects have been able to devise.

After every trip each car is thoroughly cleaned and at frequent intervals fumigated in accordance with state and federal standards.

To accomplish this three hundred and eighty-three cleaning stations, with over four thousand yard employes, are maintained in various cities.

By such thorough and consistent effort every Pullman passenger receives the greatest possible protection from the discomfort of dust and dirt usually associated with railway travel.

BLUE STREAKS

Faithful Tires

GOODYEAR Blue Streak Motorcycle Tires are staunch tires—fearless tires—faithful tires. Staunch through sand that twists and tugs to tear the tire from the rim.

Fearless before the bared teeth of flinty roads.

Faithful through slippery mud eager to skid the rider into a gully.

Game to the last ounce of fighting fabric, Goodyear Blue Streaks stand loyally by the rider who puts his trust in them.

Faithful tires.

Goodyear Blue Streaks carry the heavy machine guns on the Mexican border; they hold all leading world's records in racing; they are found on commercial and pleasure motorcycles wherever high quality, low cost per mile and freedom from trouble are vital considerations.

They are faithful there. They will be faithful to you.

The Goodyear Tire & Rubber Co., Akron, Ohio

GOODYEAR
AKRON

The tobacco with a flavor so delicate—yet "full"—that it might be called "rich-mildness"

15¢

In the cream-colored, nut-brown tin

IF Harmony Pipe Blend were mild *alone,* you might tire of it. "Mild-alone" tobaccos do not wear well. And "over-rich" tobaccos are almost as discouraging, for they surfeit the palate in time as you've probably found.

The charm of Harmony Pipe Blend is in the happy balance of its several Imported and Domestic tobaccos—so intimately blended that you cannot tell where mildness leaves off and richness begins.

You will only know, and care, that you are getting, for the first time in the history of tobacco blending, a flavor so agreeable and so unusual that it might well be called "rich-mildness."

And surely it would please you, now wouldn't it, to find such a tobacco that never grew tiresome.

Liggett & Myers Tobacco Co.

To be had at clubs, hotels and most tobacconists

OR WE WILL SEND IT TO YOU. If your dealer cannot supply you, enclose 15 cents in stamps, and we will send you this full-sized one-eighth pound tin, postage prepaid. Liggett & Myers Tobacco Co., 212 Fifth Avenue, New York.

HARMONY

A PIPE BLEND

Please Mention Popular Mechanics

Rings on Your Fingers Wherever You Work

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It is possible now for you to wear a handsome gem-set ring hour in and hour out. Men who have been afraid to wear gem-set rings while at work on account of breaking or losing the stone can now wear these W-W-W rings whatever their duties.

For W-W-W rings are guaranteed. *If a stone comes loose and is cracked we will replace it free.* So you run no risk.

You don't have to bother taking off a W-W-W ring when you start out in the morning or any time during the day. You don't run any danger of misplacing it. You don't have to save your ring for Sunday and off-duty wear.

W-W-W Rings

With Stones Guaranteed to Stay

W-W-W rings for men are all of solid gold, in 4,000 styles, set in precious and semi-precious gems of great beauty. You may select your birthstone, for instance. Some are emblem rings. There is one, certainly, of the 4,000 which you would like to possess.

You'll be surprised at the low prices. For $7, $10, $12, $15, $18 or $20 you can get a very handsome W-W-W ring with our famous guarantee.

Go to your jeweler today and ask him to show you these famous W-W-W rings with the guaranteed stones. Tell him that you must have one "in which the stones do stay." The W-W-W guarantee is an added security.

If your dealer hasn't genuine W-W-W rings, write us giving his name and address. We will then see that you are supplied with the ring you want. The letters W-W-W are engraved inside each ring. Insist on seeing them before you buy.

We have a booklet entitled "The Romance of the Ring," which will help you in selecting the ring you want. It also includes a list of the birthstones and their meaning. We shall be glad to send this book to you if you will let us have your name and address.

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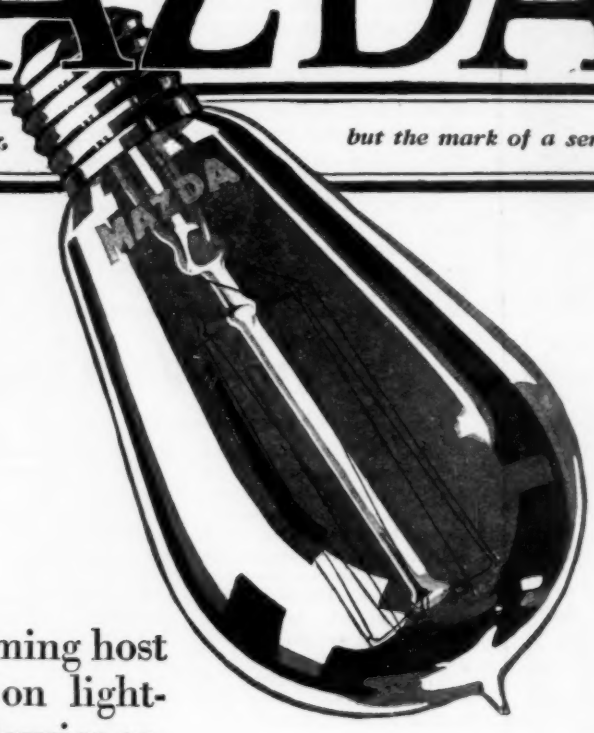
"Not the name of a thing, but the mark of a service"



From the incoming host of new ideas on lighting, MAZDA Service selects for the makers of MAZDA Lamps, only those developments in design, materials and methods that will improve the light you enjoy

The Meaning of MAZDA

MAZDA is the trademark of a world-wide service to certain lamp manufacturers. Its purpose is to collect and select scientific and practical information concerning progress and developments in the art of incandescent lamp manufacturing and to distribute this information to the companies entitled to receive this Service.

MAZDA Service is centered in the Research Laboratories of the General Electric Company at Schenectady, New York. The mark MAZDA can appear only on lamps which meet the standards of MAZDA Service. It is thus an assurance of quality. This trademark is the property of the General Electric Company.

RESEARCH LABORATORIES OF GENERAL ELECTRIC COMPANY

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"John, We Owe All These Luxuries To You and Your Oliver Agency"

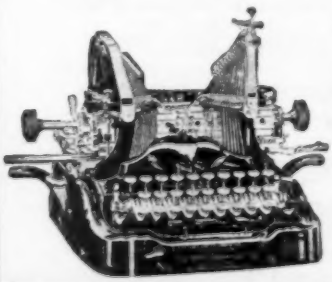
So says many a wife whose husband has gained the agency for Oliver typewriters. Oliver commissions have bought pianos, pictures, books and furniture for the home, they have provided for education, they have paid for vacation trips, they have bought automobiles, lifted mortgages and helped many men and their families to success. The Oliver Typewriter Company has paid millions in commissions during the past few years.

We offer exclusive territories to ambitious men and women who can devote part or full time as agents for Oliver typewriters. And we pay high commissions. Selling experience is not essential, as we furnish you a course in salesmanship, founded on the different successes of our agents. This course in successful business is worth a lot of money in itself. Then we back our agents with expensive national advertising campaigns and, frequently, the help of a traveling salesman. In fact, we offer assistance and co-operation to help you establish a business of your own.

An Oliver agency means handling an efficiency machine which wins friends quickly. Hundreds of thousands of Oliver typewriters are already in use and have been for years, giving satisfaction.

The new Oliver Nine is the latest model and possesses features not to be found in any other machine. The Oliver Nine is the only one with a double-arm type-bar, which insures permanent alignment. It is the only typewriter whose type-bar prints downward, which means there is no weight to lift, hence lighter touch. One feature after another like those just mentioned stamp the Oliver as a leader. Many of the foremost businesses use Olivers throughout.

In every community—in your community—there are opportunities for Oliver agents to make large commissions. Of course, every territory is not open. In many we have excellent agents who are making good money and who would not consider giving up their territorial agency under any circumstances. But in several territories we are looking for wide-awake agents, and yours may be an open territory.



Write to us now to find out if we can give you a place, telling us your qualifications, how much time you can spare and other information which will help us to advise you. If you should be fortunate enough to win an agency, it will be an opportunity of a lifetime for you and you can soon have a bigger bank account or buy the things that you have long wished for.

Send in the coupon today, as we give preference to first comers. Don't let someone get ahead of you.

Oliver Typewriter Co.
1390 Oliver Typewriter Bldg
Chicago, Ill.

Oliver Typewriter Co.
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I want to know more about an Oliver agency, as I believe I could handle one successfully.

Name .....

Address .....

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City ..... *State* .....

Please Mention Popular Mechanics

You'll find real pipe satisfaction, and a shape that fits your face, among the 24 standard styles in which these four grades of pipes are made.

BRIGHTON	35¢ and up
WINDSOR	50¢ and up
STRATFORD	75¢ and up
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They all bear the W.D.C. trade-mark ---the same mark that's on

The Wellington
THE UNIVERSAL PIPE

This mark guarantees the best in materials and workmanship that the world's largest pipe manufacturer can provide.

GENUINE FRENCH BRIAR
SOLID VULCANITE BITS

WM. DEMUTH & CO.
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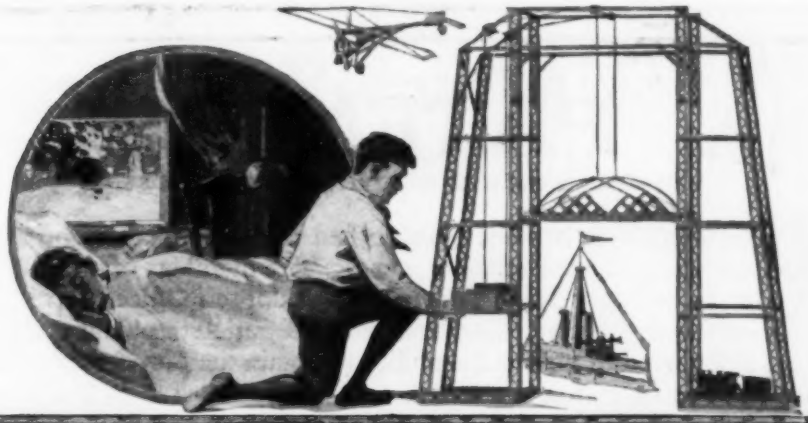

A Christmas Hint to Dad

Tell Dad you want STRUCTO for Christmas. You can build all manner of working models—drawbridges, battleships, locomotives, motor cars and motor trucks, flying machines, derricks, cranes.

The Structo Book shows you how to make all these things, without help from anyone. As you build them, you get ideas of your own and you plan and create models that you design yourself.

Many great inventors started their work as boys. They had to pick up knowledge from books and by working with others.

You have the opportunity of learning by using these great structural outfits—STRUCTO!

Tell Dad you want

STRUCTO

because it will teach you to think for yourself, to create ideas of your own, make you think as *men* think.

STRUCTO models *work*, just like the *real* machines of all kinds. Tell Dad you must have a STRUCTO outfit with the real motor that works like a charm.

This Electric Motor Given

This actual working motor, more powerful than any of its kind, is given with all STRUCTO outfits Nos. 4, 5, 6 and accessory outfit No. 3A.

You connect it with your model, turn the switch, and you make any machine do what big ones do in actual use.

The new STRUCTO (flanged) Girders make I-beams and T-beams, Channel-beams—all kinds of beams, just as they're used in bridges and buildings. Tell Dad all about these big exclusive things in STRUCTO.

Send for This Gear Free

The upper cut is the STRUCTO Gear Wheel. See the deep-cut, strong teeth. See how much larger and stronger it is than the kind pictured below, that comes with other outfits *not* STRUCTO. STRUCTO Gear Wheels are accurate. They are scientific. They have a perfect play. They are key-seated on shafts. All STRUCTO parts are made from cold-rolled steel, stiff, sturdy and shiny. They are rust-proof.

Send us the coupon and get a STRUCTO Gear Wheel free! No gears will be sent without this coupon, so be sure to enclose it. Coupon good for 30 days only, so be prompt.

STRUCTO MFG. CO., Dept. 116, Freeport, Ill.

Please send me Gear Wheel as per the advertisement in the December issue of Popular Mechanics. I enclose coupon herewith.

Name .....

Address .....

City or Town ..... *State* .....

Father's Name .....

PATENTS

71 YEARS' PRACTICE BEFORE THE PATENT OFFICE

OUR reputation has been established and sustained by prompt, conscientious and efficient work. The members of our staff of experts, in both our New York and Washington Offices, have had wide experience in the preparation and prosecution of patent applications and therefore possess the ability to obtain the proper protection to which an invention is entitled.

Anyone wishing to obtain advice in regard to the probable patentability of an invention may disclose his ideas to us with perfect confidence that his interests will be absolutely safeguarded.

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672 Woolworth Bldg.
NEW YORK

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Patent Attorneys

625 F Street
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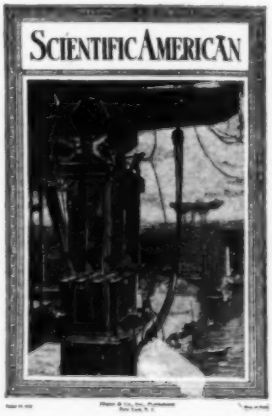
SCIENTIFIC AMERICAN

Founded in 1845
PUBLISHED WEEKLY



THE American people are pre-eminently an inventive people, and this journal has been the organ in which has appeared for the first time descriptions of many epoch-stirring inventions and discoveries.

With correspondents in various parts of this country and abroad, the SCIENTIFIC AMERICAN is in position to furnish, weekly, to its readers, articles on the latest achievements in all departments of science and industry, and no one who wishes to keep himself informed of what is taking place in the world can afford to be without it.

Many a man of prominence today obtained his first inspiration by reading the SCIENTIFIC AMERICAN.

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MUNN & CO., Inc.

Woolworth Building **Publishers** **New York**

This Is A Remarkable Breast Drill

We do not believe that you can buy a Breast Drill that has embodied in it as many valuable features as there are in this wonderful tool, for anything like the price we ask.

Provision is made to prevent wear on the spindle of this Drill. The steel pinions and the strength and reliability of the gear shifting device are notable points. We name a number of other excellent features below.

GOODELL-PRATT
1500 GOOD TOOLS

This Drill has a malleable iron, japanned frame, polished hard wood handles, cut teeth gears. It has two speeds, changed by turning the nut on the frame marked "fast" and "slow."

From our big catalog you can learn more of this Drill and our 1500 Good Tools or improvements new to you and which will make your work easier and more profitable. There is a Goodell-Pratt Tool for practically every purpose.

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Toolsmiths
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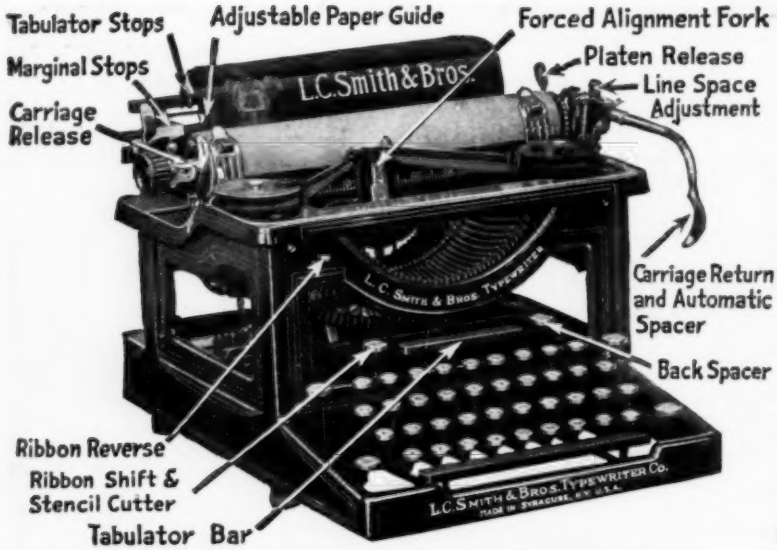


I want, through this advertisement, to establish as friendly business relations with you as I possibly can. I want you to realize also that it is my earnest effort and intention to give you full honest value for every dollar that you spend with me. This is the only way I can succeed. My advertisement has appeared in this magazine continuously for more than four years.

I am building up my business on the foundation of good value and square dealings. I am saving thousands of satisfied customers thousands of dollars, by supplying perfect—late style—visible writing—typewriters, at remarkably low prices.

All my transactions are handled throughout by personal correspondence I assure you every courtesy and consideration in your dealings with me. Your order will have my prompt, careful, personal attention. I will be glad to do business with you.

Harry A Smith

ALL LATEST IMPROVEMENTS

TYPEWRITER SENSATION

Free TRIAL—Use As You Pay

Send me only $2.50 a month until the low total price of $48.80 is paid, and the machine is yours

This is absolutely the most generous typewriter offer ever made. Do not rent a machine when you can pay $2.50 a month and own one. Think of it—Buying a $100.00 machine for $48.80. Cash price, $45.45. Never before has anything like this been attempted.

STANDARD VISIBLE L. C. SMITH

Perfect machines, standard size, keyboard of standard universal arrangement—universally used in teaching the touch system. The entire line of writing completely visible at all times, has the inbuilt tabulator with billing devices, the two color ribbon—with automatic reverse and key controlled shift, automatic flexible paper feed—automatic paper fingers, the back spacer—ball bearing carriage action—ball bearing shift action—ball bearing type bars—in fact, every late style feature and modern operating convenience. Comes to you with everything complete, tools, cover, operating book and instructions, ribbon, practice paper—nothing extra to buy.

You cannot imagine the perfection of this beautiful reconstructed typewriter until you have seen it. I have sold several thousand of these perfect latest style L. C. Smith machines at this bargain price and every one of these thousands of satisfied customers had this beautiful, strictly up-to-date machine on five days' free trial before deciding to buy it. I will send it to you f. o. b. Chicago for five days' free trial. It will sell itself, but if you are not satisfied that this is the greatest typewriter you ever saw, you can return it at my expense. You won't want to return it after you try it—**you cannot equal this wonderful value anywhere.**

You Take No Risk—Put In Your Order *Now*

When the typewriter arrives deposit with the express agent $8.80 and take the machine for five days' trial. If you are convinced that it is the best typewriter you ever saw, keep it and send me $2.50 a month until my bargain price of $48.80 is paid. If you don't want it, return it to the express agent, receive your $8.80 and return the machine to me. I will pay the return express charges. **This machine is guaranteed just as if you paid $100.00 for it.** It is standard. Over one hundred thousand people own and use these typewriters and think them the best ever manufactured.

The supply at this price is very limited, the price will probably be raised when my next advertisement appears, so don't delay. Fill in the coupon today—mail to me—the typewriter will be shipped promptly. There is no red tape. I employ no solicitors—no collectors—no chattel mortgage. It is simply understood that I retain title to the machine until the full $48.80 is paid. **You cannot lose. It is the greatest typewriter opportunity you will ever have. Do not send me one cent. Get the coupon in the mails today—sure.**

HARRY A. SMITH, 510-231 N. Fifth Ave., Chicago

H. A. SMITH
Room 510-231 N. Fifth Ave.
CHICAGO, ILL.

Ship me the L. C. Smith F. O. B. Chicago, as described in this advertisement. I will pay you the $40.00 balance of the SPECIAL $48.80 purchase price, at the rate of $2.50 per month. The title to remain in you until fully paid for. It is understood that I have five days in which to examine and try the typewriter. If I choose not to keep it I will carefully repack it and return it to the express agent. It is understood that you give the standard guarantee for one year.

Name .....

Address .....

..... Pop. Mech. Dec.

The Statesman's Choice—"PIPER"

Nothing helps mental concentration and clear judgment like a companionable chew of "PIPER." Men whose occupations demand careful deliberation and reflection naturally acquire the helpful habit of using plug tobacco—and experience leads them to the highest type of chewing tobacco made—

PIPER Heidsieck

CHEWING TOBACCO

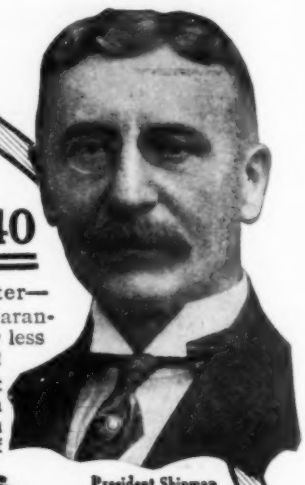
The famous flavor of "PIPER," blended through the ripeness and mellowness of the finest tobacco leaf grown, affords the most appetizing, relishful, enjoyable chew in the world. The carefully selected, thoroughly matured white Burley leaf in "PIPER" retains this pleasing taste, and insures lasting satisfaction. There is no other tobacco like "PIPER"—as a trial will quickly demonstrate.

5c and 10c cuts, foil-wrapped, in slide boxes. Also 10c cuts, foil-wrapped, in metal boxes. Sold everywhere

THE AMERICAN TOBACCO COMPANY

$100 Model UNDERWOOD

$37.40



President Shipman

This is my special, short-time offer to Popular Mechanic's readers. It means that you get a genuine UNDERWOOD Typewriter—delivered in perfect condition—guaranteed in every way—for *considerably* less than half the manufacturer's price!

Moreover, you don't have to buy it to try it! I will send one to you on 10 Days' Free Trial. Write all you please on it for 10 days and then if you are not *perfectly* satisfied—send it back to me *at my expense.*

You Can Either

RENT Applying Rent on Purchase Price

OR

BUY For Cash or Easy Payments

What's more, if you do not care to buy, you may rent it at our low monthly rate. If later you want to own it, we will apply **6 months' rental** payments on the purchase price.

Any National Bank in Chicago, or any Dun's or Bradstreet's Agency anywhere will tell you that we are responsible. Write me today—send me your name and address on the coupon or a postcard.

E. W. S. SHIPMAN, *President*

TYPEWRITER EMPORIUM, *Est. 1892,* **34-36 W. Lake St., Chicago, Ill.**

My Other Plan Brings You This Underwood FREE

Learn about it. There is no canvassing or soliciting involved. You will be surprised at its simplicity. If you want a splendid typewriter and want to get it without taking a penny out of your own pocket, use the coupon—send us your name and address on it or a postcard —*today.*

Mail This Coupon Today

E. W. S. SHIPMAN, President Typewriter Emporium 34-36W. Lake Street, Chicago, Ill.

Send me immediately full details of your offer No 652

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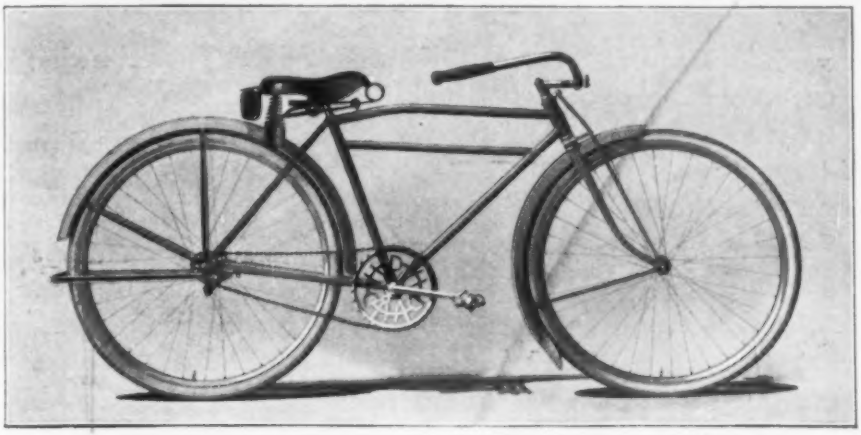

This model is equipped with Firestone non-skid black tread red side wall motorcycle fabric tires

And Now—A Harley-Davidson Bicycle

Beauty—of line and finish—dependability, balance and quality—all the experience-bought knowledge gained in more than fifteen years of high-grade motorcycle building, characterize the Harley-Davidson line of bicycles for men and women, boys and girls. There are seven distinctive models. The

Harley-Davidson Bicycle

is a wheel you will be proud to ride. Like the motorcycle, it is finished in a beautiful military olive drab. It has finely adjusted steering head bearings, which with specially designed front forks provide unsurpassed light steering qualities.

Sturdy, balanced hangers and carefully ground bearings insure easy running. Rims, spokes, hubs, coaster brakes, saddles and tires are all of the same high quality that has helped the Harley-Davidson motorcycle to smash speed and endurance records year after year. And this bicycle is not high priced. Tremendous production enables us to sell Harley-Davidson bicycles at prices you might expect to pay for wheels possessing less merit. Don't be satisfied with any bicycle but a Harley-Davidson. See one at your dealers—write for descriptive literature.

HARLEY-DAVIDSON MOTOR COMPANY

Producers of High-Grade Motorcycles for More Than Fifteen Years
481 B Street, MILWAUKEE, WIS., U. S. A.

Our Mr. Downs

If you had lived in New Haven, Conn., back in the early forties, you would have seen Mr. Downs quite often.

He used to go from one store to another with a basket on his arm.

If you had looked into the basket, as he argued with the skeptical storekeeper, you would have been astonished to see queer shoes, made of a strange new material. It was rubber.

Mr. Downs was the first salesman employed by the first firm ever licensed to make rubber goods—a firm founded in 1842.

Today, 6500 Mr. Downses are required to sell the enormous volume of footwear developed by the United States Rubber Company during the last 74 years.

There are 47 great companies which are the producing units of the United States Rubber Company, *the largest rubber manufacturer in the world.*

In the early days, rubber shoes were crude and few. They were an oddity, suspected by the public and only accepted by the doubting retail dealers for sale on a commission basis.

How time has changed all this!

The world has learned to look on rubber footwear as a blessing. You see it on the streets, in homes, playgrounds, industries, camps and wilderness. You find it in every shoe store.

Over sixty million pairs of rubber boots, shoes, overshoes and canvas shoes with rubber soles were produced in the factories of the United States Rubber Company in the last twelve months—enough to shoe half the people in this vast country.

Yet the production of footwear is only one of the activities of the United States Rubber Company.

On an equally tremendous scale it makes *raincoats, tires, druggist sundries, hose, belting, packing and all rubber goods for mechanical uses.*

The output of the United States Rubber Company, though huge, is balanced. Its prosperity does not depend upon any one product. And thus the full and continued degree of service rendered by this great organization to the public is assured.

United States Rubber Company

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The Real Christmas Thought
Give Him a Gillette

A Gillette from some clever little woman has made many a man grateful to her—from Christmas to Christmas over and over again. A handsome gift with a sure appeal to the practical man.

The Bulldog, the Aristocrat, the Standard Set or Pocket Edition —$5; with gold-plated razor, $6. Or more elaborate—a Combination or Traveler's Set, $6 to $50.

A clever "little gift" is a packet of Gillette Blades—50c. or $1. Dealers everywhere. Write us for Catalogue.

GILLETTE SAFETY RAZOR COMPANY

BOSTON, MASSACHUSETTS

NO STROPPING NO HONING

TRADE Gillette MARK

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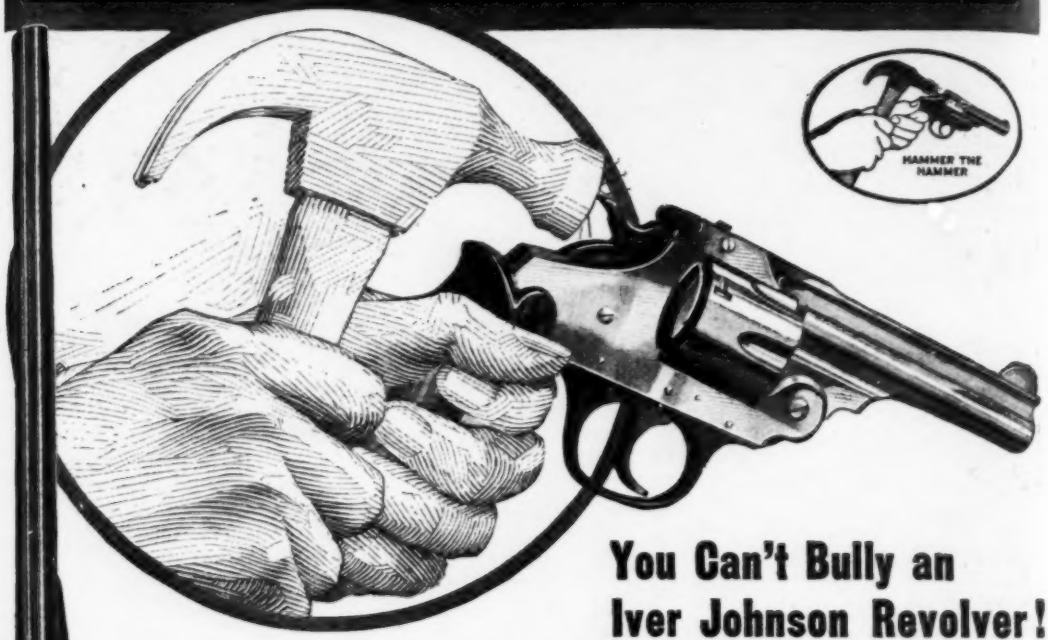

You Can't Bully an Iver Johnson Revolver!

An Iver Johnson knows but one master—a long pull on the trigger.

It cannot be fired in any other way. It is absolutely safe, even under the forceful blows of a hammer. You can throw an Iver Johnson Revolver against a solid brick wall—drop it—kick it around the room—the cartridge will not explode. Isn't this the kind of a safety revolver you need for the protection of your home?

An Iver Johnson shoots straight with a terrific smash. Its safety is a part of the action itself. Unbreakable permanent tension wire springs insure a lifetime of perfect service. Iver Johnson Safety Automatic Revolvers are made in Hammer and Hammerless models with Regular, "Perfect" Rubber and "Western" Walnut Grips. Prices, $6. to $8.

Buying a shotgun this fall? An Iver Johnson Hammerless (shown at the left, price $20.) is the double gun for you; an Iver Johnson Champion is the sportsman's choice of single guns.

Iver Johnson Bicycles can't be beat for speed, strength, easy riding and long-wearing qualities. Adult models $35. to $55. Juveniles $20. to $25.

You will enjoy reading our 80-page catalog. Sent free.

It gives more useful information about revolvers, guns, bicycles and motorcycles than any book ever printed. It tells how to make every dollar you spend for cycles and firearms buy one hundred cents' worth of service and satisfaction.

Hammer Model "Western" Walnut Grip—$7.50

Iver Johnson's Arms & Cycle Works
307 River Street Fitchburg, Mass.

New York: 99 Chambers St. — San Francisco: 717 Market St.

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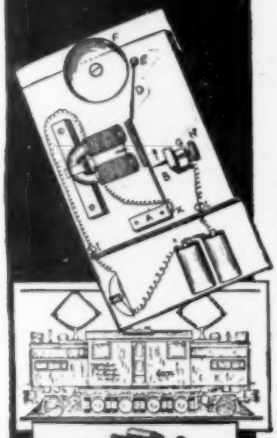
Hello Boys! Great Fun Learning the Mystifying Secrets of Electricity



Show your friends that, at your bidding, the wonderful power of electricity will do marvelous things for you —and that you are acquiring knowledge that may make you another Franklin, Marconi or Edison in the years to come. Get GILBERT'S

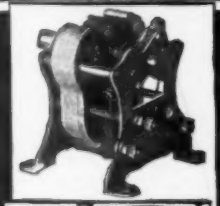
ERECTOR Electrical Set

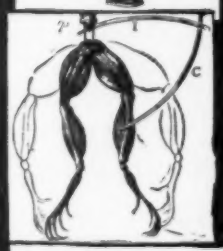
It is the most wonderful toy in the electrical world. Once you see it, your hands will fairly twitch to get hold of it. With this remarkable set, you will be able to build your own motor that will work both backward and forward, and regulate its speed at will, so that your Erector models, mechanical toys, electric trains, etc., can be operated perfectly.

And the great, big, beautifully illustrated book containing an elementary course of electricity, which comes with every set, will show you how to do more than a hundred intensely interesting electrical experiments—how to build your motor, make magnets, wire door bells, electric lights; construct switches, etc.

Ask your dealer to show you the ERECTOR Electrical Set today. Price, $5.00. Canada, $7.50.

Learn how you can get free membership in the Gilbert Institute of Erector Engineering, which offers handsome diplomas, and valuable prizes. Mail coupon for my big book which tells all about it.





Get These Erector Electrical Accessories

P. 60—TRANSFORMER—For alternating current only, 110 volt, 60 cycle. Delivers either 4, 8 or 12 volts, open circuit. Keeps cooler than any other. High grade insulation prevents shock. Five ft. cord and plug attached. $3.00. Canada, $4.50.

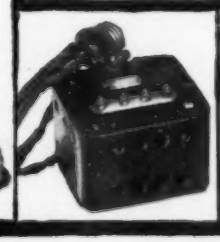
P. 56—ERECTOR MOTOR—Either alternating or direct 110 volt house current. Self-lubricating—easily replaced. Self Starter. Motor is series wound. Well ventilated. Runs cool. 5 ft. cord and plug attached. $5.00. Canada, $7.50.

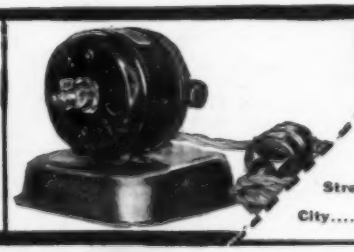
P. 58—ERECTOR MOTOR—Current:—Battery. Tubular holder with copper gauze brushes easily replaced. Self Starter. Reversible. Four terminals to which separate Reverse Switch Base can be attached. $1.50.

P. 54—ERECTOR MOTOR—Pressed steel base. Current:—Battery. Tubular holder with copper gauze brushes—easily replaced. Self Starter. Reversible. Enables operation of models on a long string from any distance. $2.00. Canada, $3.00.

If your dealer cannot supply you, *write us today!*

THE A. C. GILBERT CO., 104 Fox St., New Haven, Conn.





THE A. C. GILBERT CO.
104 Fox Street
NEW HAVEN, CONN.

Please send me free the Nov. issue of your boys' magazine, "Erector Tips," and your new book, "How to Become an Erector Master Engineer."

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Street .....

City.....State.....

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Could You Make This Shot?

It is a hard one, but possible for a keen eye and a steady hand. It is only one of the countless interesting shots in Billiards and Pool. All of them can be made on a

BURROWES

Billiard and Pool Table

Billiards and Pool are great games anywhere, but far more enjoyable in your own home on your own table. Burrowes Tables are correct in every detail. The most delicate shots can be made with the utmost accuracy. Some of the leading experts use them for home practice. Burrowes Regis High-Speed Rubber Cushions are unquestionably the finest cushions made.

$1.00 DOWN

Prices of Burrowes Tables range from $15 up, on terms of $1 or more down and a small amount monthly. Cues, balls, etc., free. Sizes range up to 4½x9 ft. (standard), with smaller sizes for smaller rooms.

No Special Room Needed

You can put up or take down your Burrowes Table in a moment. Mount it on your dining or library table or on its own legs or folding stand.

FREE TRIAL—NO RED TAPE

On receipt of first instalment we will ship Table. Play on it one week. If unsatisfactory return it, and on its receipt we will refund your deposit. This insures you a free trial. Write for illustrated catalogue, giving prices, convenient terms of payment and full information.

THE E. T. BURROWES CO.
162 Spring Street, Portland, Me.
Burrowes Tables are now on sale in many cities and towns. You can inspect them before ordering if you wish.

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BIG VALUES IN SWEATERS

Sweater Coats at Bargain Prices Guaranteed by "THE HOUSE OF BRUNSWICK"

Jumbo-Stitched, Guaranteed All-Wool Sweater Coat. Full-sized, full-fashioned, full-length sleeves, with two lower pockets and a three-piece, shaker-stitch shawl collar. Reinforced shoulders and faced front to insure strength and permanent shape. Sizes 34 to 46.

Colors: navy, maroon, oxford.

A duplicate of this jumbo-stitch, all-wool coat would cost not less than $6.50 anywhere else. **Our Special Price—P866 $4.90**

Write for our encyclopedia of sporting goods. It gives information regarding basketball, indoor ball, hunting, fishing, home exerciser outfits, etc.

The Brunswick-Balke-Collender Co.
Dept. 28, Chicago, Ill. (625)

METAL PIPE CASES

Cases are adjustable with extension device to fit various shapes and length of Clay Pipes. No odor or ashes. Each CASE is enclosed with imported Pipe Free. Nice for Christmas Present. Send Money Order or 2¢ stamp for Cir

to The Monarch Service Co. 15 Cornhill Boston Mass.

When You Build

please bear in mind that there is still plenty of

WHITE PINE

Send for our free booklet, "WHITE PINE IN HOME-BUILDING"

WHITE PINE BUREAU
1626 Merchants' Bank Bldg. ST. PAUL, MINN.

Wrestling Book FREE

Learn to be an expert wrestler. Know scientific wrestling, self-defense, and jui-jitsu. Develop a splendid physique, and have perfect health. Join this popular school and **learn by mail.** The famous world's champions—the marvelous

Frank Gotch and Farmer Burns

offer you a **wonderful opportunity.** Wrestling is easily and quickly learned at home **by mail.** Men and boys write **now** for **splendid free book.** Learn all the science and tricks. Be able to handle big men with ease. Accept this wonderful offer NOW. Send for **free book today,** stating your **age.**

Farmer Burns School of Wrestling, 9199 Ramge Bldg., Omaha, Neb.

Acetylene Blow Torch

Prest-O-Torch

Quicker and cheaper than a gasoline blow-torch for brazing and soldering

For factories, repair shops, linemen, dentists, jewelers, the Prest-O-Torch saves time and money. Used with Prest-O-Lite Tanks—ready-made gas. Intense, concentrated flame instantly lighted. No depreciation, safe and convenient. Style "A", price, 75c (Canada, 85c) will braze up to ⅜ inch round rod. Style "C" for heavier work, $2.25 (Canada, $2.75). Special styles for dentists. Write for literature or send order now. Money refunded if not satisfied.

The Prest-O-Lite Co., Inc. 816 Speedway Indianapolis, Ind.
Canadian Main Office and Factory, Merritton, Ont.

Electricity's Latest

A Sewing Machine No Bigger Than a Typewriter

An electric sewing machine that you can carry—actually carry in one hand—from room to room. When not in use, it can be put away on the closet shelf.

Western Electric Portable Sewing Machine

This is the last word in electrical household conveniences—a full-sized, high-grade sewing machine without the heavy iron frame, treadle and other parts which are made unnecessary by the electric motor which is a part of the machine. A pressure of the foot on the control pedal gives exact speed desired.

This is the greatest gift of electricity since the electric iron and electric vacuum cleaner. Learn all about it, and you will never again pedal away your energy on an old-fashioned sewing machine.

One of the best things about it is the price, $35.00—less than you would pay for most any of the well-known makes of foot-power machines.

Write nearest branch house for Booklet No. 501-AW

WESTERN ELECTRIC COMPANY

INCORPORATED

New York, Buffalo, Newark, Philadelphia, Boston, Atlanta, Richmond, Savannah, New Orleans, Birmingham, Pittsburgh, Cleveland, Cincinnati, Detroit, Chicago, Milwaukee, Indianapolis, St. Paul, Kansas City, St. Louis, Dallas, Minneapolis, Denver, Salt Lake City, Omaha, Oklahoma City, Houston, San Francisco, Oakland, Los Angeles, Seattle, Portland

EQUIPMENT FOR EVERY ELECTRICAL NEED

America's Electrical Week, December 2nd to 9th

"Christmas Morning"

By Claire Briggs

DO not laugh, gentle reader. You are witnessing the keenest tragedy of boyhood. The young man who has just picked the trousers off the Christmas tree, had reasonably hoped for a King Air Rifle instead. Now behold him filled with disappointment and mortification as his chums "present arms"—the handsome Kings they wished for and got.

No *regular* Dad would play a shabby trick like this on *his* boy! No. To the hardware store he'd go, and let Sonny pick out just the King to fit his size. The prices are 25c to $2.50.

Send for the Briggs Book

—full of cartoons of boys having fun with Kings; containing story of the air rifle and how it is made, and listing the full King line with prices.

Send 2c stamp to Dept. E

The MARKHAM AIR RIFLE CO.
Plymouth - - Michigan

500 SHOT REPEATER, No. 22 King. Lever action. Automatic loading. Nickeled barrel. Walnut stock. At your dealer's or direct from factory, prepaid for . . **$1.25**

KING AIR RIFLES

TOYCRETE

A Different Construction Toy

Makes every practical style of building block out of cement. An education in concrete work. Instructions and designs with each set—

50c to $2.00

Wherever Toys are Sold

Toycrete, Evanston, Ill.

I PRINT MY OWN

Cards, circulars, menus, book, paper, etc. Press $5. Larger $18. Rotary $60. Save money. Print for others, big profit. All easy, rules sent. Write factory today for illustrated catalog presses, TYPE, cards, samples.
THE PRESS CO. D-37. MERIDEN. CONNECTICUT.

$25.00

and more may be made each week raising guinea pigs in spare time. Big demand. Experience or special knowledge unnecessary. Big illustrated book and particulars free.
LABORATORY SUPPLY CO., Dept. B, 2841 Ridge Ave., Phila., Pa.

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Better Than Chickens
Young pigeons (squabs) bring 40 to 60c each when 3 to 4 weeks old. Big demand in city markets. Each pair of pigeons easily clear $4 per year. Always penned up. Very little space and money needed to start. Free Book explains all. MAJESTIC SQUAB CO., Dept. 55, ADEL, Iowa.

MAKING POULTRY PAY

depends more on the knowledge you have of Poultry Culture than on expensive equipment or extensive space.

Let Director Quisenberry teach you how to raise poultry successfully and make a good living and a nice profit from a flock of thrifty hens.

If you want to save money and make money in the poultry business write us today for our large illustrated **Free Book, "Dollars and Sense in the Poultry Business."** It points the way to success.

American School of Poultry Husbandry
Box 75 Mountain Grove, Missouri

CORRECT Coal-burning HOVER

(Patent Pending) ***Prices Quoted are F. O. B. Factory***

COSTS ONLY 5c Or Less a Day to Run Capacity 50 to 1500 chicks. Positive regulation; perfect ventilation. Portable. Raises all the chicks. Guaranteed to do what no other coal-burning hover will do. Absolutely biggest value of the year. **Circulars Free—Write Today.**

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CORRECT HATCHER CO.
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Learn to letter **Price Tickets and Show Cards.** It is easy to do **rapid, clean-cut lettering** with our improved Lettering Pens. **Many persons make good money by lettering price tickets and show cards for the smaller merchant, outside of regular working hours.** Practical lettering outfit consisting of 3 Marking and 3 Shading Pens, 2 colors of Lettering Ink, sample Show Card in colors, instructions, figures and alphabets, Prepaid $1.00.

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Toy Engineering For Boys

Boys! Here's What You Want!

The Patented parts in every MECCANO outfit represent correct engineering elements; they duplicate the parts used by real engineers. With these parts even the youngest boy can build models that are faithful copies of great Cranes, Bridges, Towers, and other things real engineers build. You can build model machines that run—Automobiles, Electric Locomotives, Elevators, Sawmills, Windmills, Printing Presses, Lathes, Engines, and hundreds of others. *You can build anything you see; anything you can think of.*

The MECCANO Spring and Electric Motors run your models like real machinery. They are perfect power plants; master types; correct in construction and unfailing in operation.

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This Giant MECCANO CRANE

is only one of the Many Models you can build.

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Oxy-Acetylene Welding and Cutting

Making crank shafts for electric farm-lighting outfits, by welding plate throws to cold-rolled steel bars.

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In this manufacturing plant steel drop forgings were hard to get and the price was high. Uncertain delivery was tying up production and the high cost was killing profits.

Oxy-acetylene welding was called upon to solve the problem without sacrifice of quality or profits. By no other process could this operation be done so easily, quickly, and economically. The welded parts were left in perfect condition for subsequent machining.

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Get into the welding business. It pays quick profits, and the wide and growing demand means plenty of work. Investigate.

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The World's Largest Makers of Dissolved Acetylene

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dispenses with collar button in front. It is quicker to adjust. Does not rumple the collar in adjusting. Clamps shirtband as well as collar, regardless of buttonholes. Is made of German Silver neatly polished. With proper care will last for years.
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AGENTS

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Dependable Spark Plugs

Why Quantity Means Quality

Uniform accuracy is essential to dependability in a spark plug.

Nothing so quickly detects a defect as its rapid multiplication in quantity production.

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We produce over fifty thousand Champion dependable Spark Plugs every working day.

Remember Champion Dependability—the reason for it—your assurance of it—when you replace the spark plugs in your car.

Your dealer knows which particular Champion was developed to serve your particular motor.

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Complete satisfaction to the user, free repair, replacement or your money back.

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Champion Heavy Stone, ⅞-18
Price $1.25

Cold Weather Starting Made

EASY

For Autos, Trucks, Tractors, Stationary Engines.

Do you own or drive a car? Then consider what this means to *you!* Automobile starting revolutionized; made quick, easy, absolutely dependable under the most severe weather conditions by a small, easily-installed device which any motorist can put on his own car. The Imperial Primer—

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By throwing a rich mist of *fireable* gasoline (not just raw, lifeless gasoline) into the firing points, your spark plugs are given a *live* mixture to spark on. This guarantees a quick, positive start, practically on the first turnover, no matter how long your car has stood in the cold!

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A *Necessity*—Not an Accessory

This invaluable, low-priced priming outfit consists of a small, substantially-made plunger pump all necessary bolts, connections and tubing furnished, ready to mount on the dashboard of any car. All connections made by the well-known Imperial Compression Couplings. No soldering, flaring or threading required, except on manifold.

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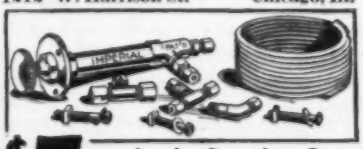
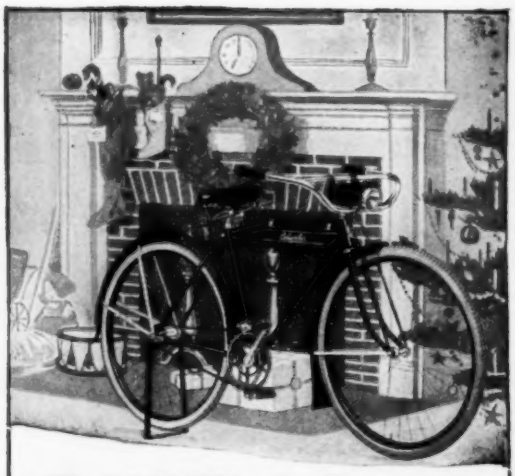


$5.00 for the Complete Outfit—Can Be Put On by Any Motorist — Fits Any Car, Any Model.



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Make them happy for all the year, not merely for the holidays. Give them a gift that will lay the foundation of future health and vigor—a clean gift, a joyous gift and, best of all, a sensible one. Give the children this Christmas a

Columbia Bicycle

You know far better than we can tell, how much this means to a boy or a girl—how every child dreams of owning a bicycle. This is the season of "dreams-come-true" and yours is the joy of fulfilling them.

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MAKE YOUR BIKE A MOTORCYCLE

at a small cost, by using our attachable outfit. Fits any Bicycle. Easily attached. No special tools required.

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Harry A. Hyatt, of Boreas River, New York, writes: "About four years ago I received my motor attachment, and wish to say that I am satisfied with it in every way, for it has certainly given me good service. Anyone wanting a motorcycle or attachment, I would recommend them to the Shaw Manufacturing Co."

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You can build it yourself or buy it complete already assembled. Parts inexpensive. Send 20c for blue print and price list of parts.

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bicycle and *know* you have the best. Buy a machine you can **prove** by actual test before accepting **DELIVERED FREE ON APPROVAL** and *30 days' trial.* No expense to you if you do not wish to keep it. **LOW FACTORY COST,** great improvements and values *never before equalled* in our 1917 models.

WRITE TODAY for our *big catalog* showing our *complete line* of 1917 bicycles, **TIRES,** sundries and parts, and learn the wonderful *low prices* and *new offers* and terms we will give you. **Do not buy** until you *know* what we can do for you. Write a post card now

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MOTORCYCLE TIRES

Look for the **Red Side Wall** and **Black Tread,** the trade mark of Firestone Tires. The same materials and workmanship as in Firestone Automobile Tires.

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THIS INSTRUCTIVE BOOK FREE

72 pages full of information and suggestions to help you save on the little things which make big automobile bills. Do you know how to save on tire cost, how to cut repair bills? This book covers in simple language **every automobile and up-keep problem.**

Free First and only book of its kind compiled. Complete in every detail with valuable information for everyone interested in automobiles. This offer is made for a limited time to acquaint you with the **American Chauffeur,** one of the livest magazines in the automobile field. Each issue contains vitally helpful information. This volume will be given absolutely **Free** with a three months' trial subscription to the **American Chauffeur.** Send 25c in stamps or coin. This is a limited offer. Send now before this edition is exhausted.

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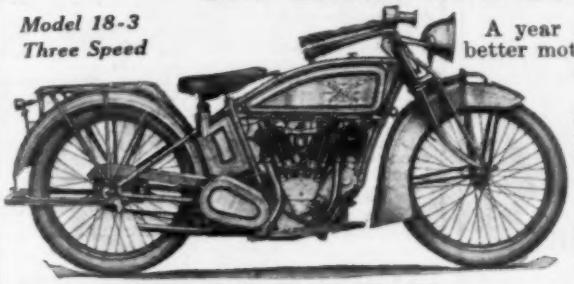
The Latest and Greatest X

Model 18-3
Three Speed



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We now fulfill that promise in **Series 18,** in which are combined new and valuable features found in no other machine and all the good points of all others.

The big features of the new X include Nickel Steel Frame with Removable Center Bar, Foot Operated Motor Starter, with Automatic Compression Control, Automobile Type 3 speed with Directly Connected Gear Shift, Automatic Gear Lock, Interlined Chain Guards and Gear Cover, Silent Muffler with new foot operated direct cut-out, Powerful Automobile Type Double Brakes and other valuable features.

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Electrically Equipped $35 Extra

Our Series 18 advance catalog is now ready and will be mailed upon request.
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Lock Your Ford Car
WITH THE NEAL AUTO LOCK

Yale cylinder lock with two keys. Fits on switch of metal coil box in one minute Machine can't be started without key.

TEN-DAY TRIAL FREE

Delivered anywhere in the U. S. on receipt of $3.00 Money absolutely refunded on return within ten days.

Send No Money If you have commercial rating we'll send lock on approval, and you can return it in ten days or keep it and pay for it It's thief-proof, easily attached, and mighty cheap insurance at the price. Send for it today **$3.00**

Agents wanted in every town

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GET 5,000 MILES MORE SERVICE by 'half-soling' them with Steel Studded Treads the same as European Motorists have been doing for the past three years. 30,000 American Motorists have done this in the last 8 months and are saving $50.00 to $200.00 a year in tire expense.

5,000 Miles Without Puncture is the signed guarantee you get with every Durable Steel Studded Tread.

WE DELIVER FREE without a cent deposit, prepay the express and allow you to judge.

SPECIAL DISCOUNT offered to motorists in new territory on first shipment direct from the factory.

THE COLORADO TIRE & LEATHER CO.
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GUARANTEED 5000 MILES WITHOUT PUNCTURE

Pulls you out of trouble

Carry this little Pull-U-Out in your tool box and you will be independent of road conditions. With it a boy can, unaided, pull a 5000 lb. car out of ditch or mud. Pays for itself on its first job. Besides pulling autos out of trouble it will do all kinds of lifting and pulling in the factory, garage, on the farm or construction job, etc.

Consists of a winding drum, lever crank, 40 feet of steel cable, two 7 ft. chains and 3 stakes. Weighs only 28 lbs. and goes in space 4x6x14 inches.

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Cheaper and better than a chain block. Does jobs no other machine can do.

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Electrically Equipped, $45.
Other Indian models, $26 to $45.

For Your Boy's Christmas Present

SOMETHING that will give him lots of healthful, muscle-making outdoor exercise—something he wants far more than anything else—an *Electrically Equipped*

Indian Bicycle

Particularly is this true of the Indian Motobike with its motorcycle style lines, Indian tank battery container, coaster brake, double forks, long-braced handlebars, electric light and large reflector—the biggest bicycle value in the world.

Or you may want to give him an actual motorcycle—not a big, powerful one, but the *Indian Light Twin,* with low riding position, just enough speed and power to make it easy and simple for any boy to handle, moderate in price, low in operating cost.

Make this your boy's happiest Christmas. Give him exactly what he wants. Let us send you Catalogs fully picturing and describing Indian Bicycles and the Light Twin Motocycle.

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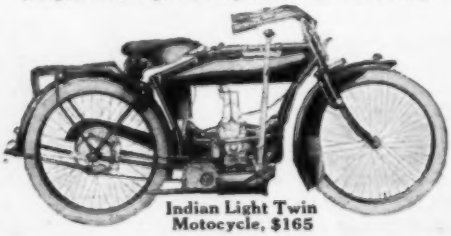

Indian Light Twin
Motocycle, $165

SMALL SET BACK
Veeder Counters
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RESET TO ZERO BY A SINGLE TURN

These counters are just as high grade as our large counters, but are lower in price. Price $4.

There are Veeder counters for practically every purpose. Our booklet describes these uses in detail and shows various instruments. It is **interesting and free.** Send for it.

The word Veeder stands for the best constructed and most accurate counting devices.

Cyclometers, Odometers, Tachometers. All kinds of counters. Fine Die Castings.

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NEW TYPE OF SIGNAL

Operated directly by explosion through priming cup opening in the cylinder.

Not an Exhaust Horn Extreme simplicity insures freedom from trouble. First cost low. No operating expense. Easily installed.

Far more effective than an exhaust horn, as gas operating has ten times the pressure. Uses but a portion of the charge, the equivalent of opening a pet cock for an explosion or two. When you hear that powerful, distinctive note, you will know it is a BUELL. **Sold on Trial. Guaranteed for Life.**

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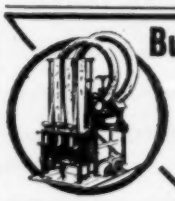

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Convert Your Bicycle into a Motor-Cycle

Motor fits any wheel. BEST, MOST RELIABLE. Best hill climber. More STEFFEYS in use than all others. Stamp for circulars.

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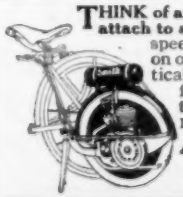
GARGOYLE

Mobiloils

A grade for each type of motor



THINK of a detachable bicycle Motor that you can attach to any bicycle in 5 minutes and ride at any speed up to 25 miles an hour—100 to 125 miles on one gallon of gasoline. Thoroughly practical—simple and economical. Full control from one small thumb lever attached to the handle bars of the bicycle.

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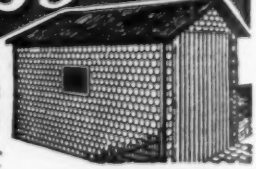

10x12feet "Steelcote" Edwards ready-to-use garage, $69.50 complete. Factory price. Fireproof. Portable. Quickly set up. All styles and sizes of garages and portable buildings. Send postal for illustrated catalog.

THE EDWARDS MFG. CO.
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MEASURE your MILEAGE
WE CAN INCREASE IT!

OR MAKE GOOD THIS GUARANTEE

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Magic Motor Gas

is a newly discovered culture for gasoline which added in very small quantities to your present grade of gasoline puts it in much better condition to use in your motor. We have sold enough to treat ten million gallons which means thirty million free miles for the public.

We Guarantee that when properly mixed with Gasoline Magic Motor Gas will reduce carbon trouble, increase motor efficiency and give at least one-fourth more mileage above what you are obtaining at the present time—OR

WE WILL REFUND YOUR MONEY
(References Dun or Bradstreets—West End Bank or any Cincinnati Business House)

Figure for yourself what a small fraction of your saving these cans cost. Fool-proof instructions on every can. Get your no risk can today.

QUART size, 32 oz. treats 160 gallons, Price prepaid..... **$2.00**
PINT size, 16 oz. special for Ford or Motorcycle. Prepaid..... **$1.25**

WE WANT FACTORY REPRESENTATIVES for exclusive territory immediately. Only men who can start at once need apply. Order a guaranteed can quick if you mean business.

AUTO REMEDY CO. 133 Auto Building CINCINNATI, U.S.A.

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No. 102, 6 sizes: 1/4" TO 1 1/4

For easier pipe-threading take a Bull-Dog Die-Stock and try out the 5 BIG FEATURES: (1) Self-locking dies, (2) Self-centering guides, (3) No resetting, (4) No "unwinding" over the finished thread, (5) No loose parts. Write for catalog, *"The Bull Dog Tale,"* showing eleven handy sizes. Plain and ratchet.

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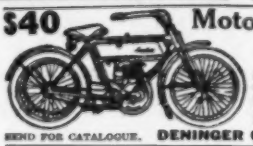
$40



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Second-hand and rebuilt motorcycles, singles and twins, $25 to $100. Motorcycle tires, $3; Automobile tires, $3. Second-hand bicycles, $5; tandems, $10. New bicycles and motorcycles at Factory prices. Buy direct, save dealer's profits.

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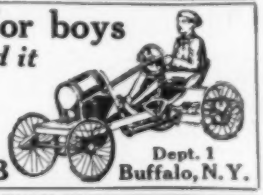
IF IT ISN'T

AN EASTMAN

IT ISN'T A KODAK

A real auto for boys
You can build it



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Commonwealth Motors Co., Chicago

STANWELD Cold Drawn Seamless Steel **TUBING**

Lightest, smoothest, strongest Steel Tubing made. World's largest manufacturers of bicycles, motorcycles and automobiles use it exclusively. Send for Folder "A."

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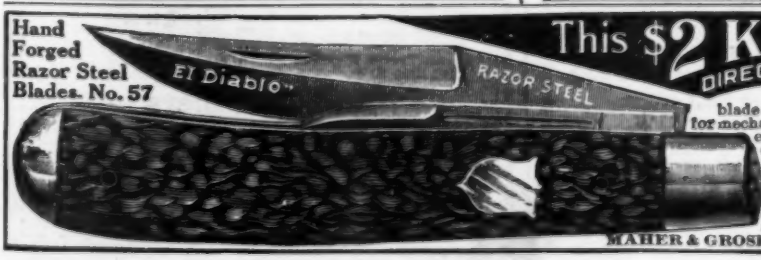
GOODRICH "GIANT"
The best bicycle tire made. *Ask your dealer*
The B. F. Goodrich Company, Akron, Ohio

Hand Forged Razor Steel Blades. No. 57



This $2 KNIFE 83¢ POST PAID
DIRECT AT FACTORY PRICE

Handy shaped blade makes this knife best for mechanics, sportsmen and farmers; light but strong; resharpened easily. Stag handle, German silver finish; blades file tested, hand forged from razor steel and warranted. Sample 83c, 3 for $2 postpaid. Choicest pearl $3 each.

Send for our 80 Page List and "How to use a Razor" **FREE**

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Our bargain bulletin will answer your gift problem and show you how to **save money.**

Save 25% to 50%

on any camera you want, from Vest Pocket Kodak to Graflex—from a Box Brownie to a "Movie Outfit."

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For a Merry Christmas and Lots of Fun

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The National Camera Exchange Est. 1885
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WHY NOT

spend Spring, Summer, Fall gathering insects, butterflies, for me? I pay highest cash prices for 750 kinds. Some worth $1—$7. Men, Women. If you mean business, send 2c stamp for literature. It may mean big profits and easy outdoor work for you. Get posted **now** for Spring season.

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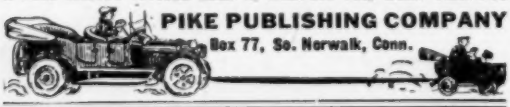
All the latest and best funny jokes and stories on the FORD automobile. Hundreds of them and all good ones. Also JITNEY jokes, Moving Picture, and Stage jokes. Laugh till you shake. A neat colored covered book by mail for only **TEN CENTS.**



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Box 77, So. Norwalk, Conn.

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Yes, we will send you the New Edison, the product of the world's greatest inventor's genius, the phonograph with the wonderful diamond stylus reproducer and your choice of the latest Diamond Amberol Records on *free trial without a penny down.* On this offer, you can have the genuine Edison, the instrument which gives you real, life-like music, the finest and best of all phonographs at a small fraction of the price asked for imitations of Mr. Edison's great instrument. *Seize this opportunity.* Send the coupon now for free catalog.

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Think of it—a $1 payment, and a few dollars a month to get this wonderful new style outfit—Mr. Edison's great phonograph with the Diamond Stylus reproducer, all the musical results of the highest price outfits—the same Diamond Amberol Records—yes, the greatest value for $1 down, balance on easiest monthly terms. Convince yourself—free trial first! No money down; no C.O.D., not one cent to pay unless you choose to keep the instrument.

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Entertain your family and friends with the latest song hits, with your favorite, old-time melodies—with everything from grand opera to comic vaudeville. Roar with laughter at the side-splitting minstrel shows. Then, after the trial, send it back at our expense if you choose. Or keep it on our great, rock-bottom offer. *Send the coupon today—now.*

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Gentlemen: Please send me your New Edison Catalog and full particulars of your free trial offer on the new model Edison Phonograph.

Name .....

Address .....

Look at my price for Genuine Blue White

Sensational Bargains in Diamonds

1/8 Carat	1/4 Carat	1/2 Carat	1 Carat
$6.25	$15.50	$40.25	$88.00

Since last Christmas, I have succeeded in bringing safely through the War Zone, three large importations of diamonds. This fact alone makes it possible to continue our Before-the-War Bargain Price—$88.00 per carat, for perfect cut Blue White diamonds. Vast stock provided, ample we hope, for old and new customers, and while this stock lasts, I shall positively not increase prices, in spite of War Increased costs, and regardless of what our competitors may do.

Diamonds Scarce but Barnard Prices No Higher!

Neverbeforeinitsentire history has the diamond business seen a time like now. The supply of stones in comparison to the demand approaches a condition of famine and in the general market prices are soaring sky-high! Why, the **cutters** are asking **importers** $95.00 and $100.00 per carat for the Blue White perfect cut diamonds we are selling to the **consumer** for $88.00 per carat! But we have protected you. We have thrown our entire resources into a vast stock in preparation for our Christmas business, and, for the time being, our prices are no higher than formerly. You can still get a genuine, Blue White perfect cut diamond for only $88 per carat.

12 Hour Service; You Can Depend on Barnard

Our old customers know we fill every order the **same day;** that we do not disappoint or delay. New customers are invited to send for our book, and place their orders with the certainty that we will keep our promise of fast, expert service. If you order early, you will get the benefit of **choicest values.** If you are compelled to order the "Night before Christmas," **we will not fail you.**

I will consider it a personal favor if you will order early

By confining our business to **diamonds exclusively,** I personally serve every BARNARD customer. I will therefore deeply appreciate your co-operation, and will thank you to place your order **as early as possible,** so that the burden will be distributed over the entire month, instead of crowded into a few days. I am sure that the benefits will be mutual, too.

Gustav Barnard
President

No. C2111—1/8 ct. Blue White perfect cut dia. complete with 14K mounting **$8.00**

No. C2112—1/4 ct. Blue White perfect cut dia. $15.50, 14K mounting. Comp....**$17.25**

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No. C2201 — 3/8 ct. Blue White perfect cut diamond, $29.00; 14K mounting, $5.88. Complete....**$34.88**

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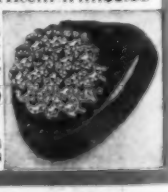
No. C2401— 14K solid gold ring, plat. setting, 21 diamonds. Our bargain price, ...**$45.00**

No. C2501

No. C2402— 14K solid gold ring, plat. setting, 21 diamonds. Our bargain price, ...**$45.00**



Blue White perfect cut diamonds, set in 14K solid gold hand made mountings.

Child's Size.....**$1.88** Misses' Size **$3.88**
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BARNARD & CO. Dept. 2288C, S. W. Corner Wabash & Monroe, CHICAGO

Perfect Cut DIAMONDS $88 Per Carat

Send No Money!!

Free examination at my expense—

I don't ask for one cent deposit or security or references of any kind. Upon your mere request, I will send you any diamond set in your favorite mounting. When it comes, examine it, see that it is true Blue White color, perfectly cut, full weight, a **better diamond** than you can get for **less money** elsewhere.

After this critical examination and comparison, you can keep it or return it at my expense. I take all the risk, all the responsibility of pleasing you, and you won't be under the slightest obligation to buy if you don't want the diamond. I know my import prices to be lower than jewelers can buy at wholesale and I invite **you** to **see for yourself** that I can save you 35% on your diamond. I will ship anywhere, by **any express** or in **care of any bank.**

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To prove the absolute worth of every diamond sold by the house of BARNARD; to prove that your investment represents its actual diamond value, I give you a **BANKABLE MONEY-BACK GUARANTEE**, as good as U. S. currency. If you buy from me, you can take your guarantee and diamond to any bank and cash in on it if you want to. Also, my guarantee allows full exchange value forever. This is the kind of diamond investment protection that makes it worth while to buy of BARNARD, and a 35% saving over retail jewelers' price makes it doubly so.

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No. C3001—Exquisite Wesselton, top Blue White, perfect cut diamonds, **very fine quality**, extra brilliant gems, in 14K solid gold Tiffany style solitaire hand made ring mounting; carat weight guaranteed, ¼-3/64 ct. Here is an example of the wonderful import values we offer. We guarantee that you cannot duplicate this ring at retail for less than $30.00 to $35.00. Only 210 of these rings in stock. Special offer to readers of Popular Mechanics Magazine, complete with French Ivory Jewel case as illustrated **$15.00**

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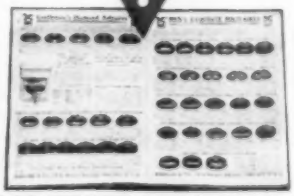

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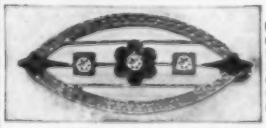

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Offers You an Opportunity No Man Can Afford to Miss

Haven't you often wished for a chance to be a big man, a factor in the industrial world, to share enormous profits?

Such a chance is offered to you now. For the first time, a man with limited means has an opportunity to start in a business that will make him a captain of industry.

The automobile tire business is one of the biggest industries of the world today, and the most prosperous. You can get in this business—in the tire repair end.

30,000,000

Tires to Repair

The automobiles of 1917, both old and new cars, will need nearly thirty millions of tires. Every one will need repairing. This enormous demand for tire repair work offers an opportunity for you. 1917 will be, by far, the biggest year in the automobile business.

Autos are common now. They are owned by people who have to economize in upkeep expense. They want to save their tires and consequently, demand tire repair service—service you will be prepared to give when you join the Haywood organization, when you have Haywood equipment. **No experience is necessary** to start in this business. Not even a knowledge of tires, as we teach you thoroughly to handle this work successfully. You can start most anywhere, and with a little energy and ambition, make a success. You can open a small shop, or start in your own home, if you prefer. One machine will take care of your work. In the Haywood line there are machines of all sizes, at prices meeting the investment you wish to make.

Write me today and get the particulars of this wonderful opportunity. Use the coupon on the next page, or send a postal. ***Do it now***

MAKE $3000 A YEAR IN

I Want More Men in This

A Nation Wide Demand

I have openings right now for at least 200 men of a mechanical turn of mind, who want to do something better than be mere mechanics, drawing so much per day. The biggest asset that such a man must have is "stick-to-it-iveness"—a little determination to succeed—a little money to invest in equipment and I will teach him to start in one of the best and biggest money making propositions ever opened to young men. Through my six years of national advertising, I am creating a nation wide demand for the **Haywood Standardized Tire Repair Service**, which I have demonstrated time and again is the best thing of its kind in the country.

Right now there are at least two hundred important centers where autoists are demanding Haywood Service and can't get it, except at long range. It is for these centers that I want men.

HAYWOOD TIRE AND

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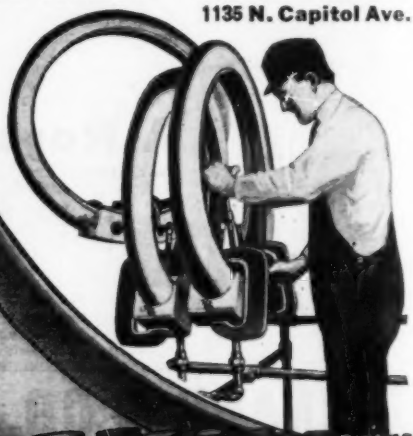
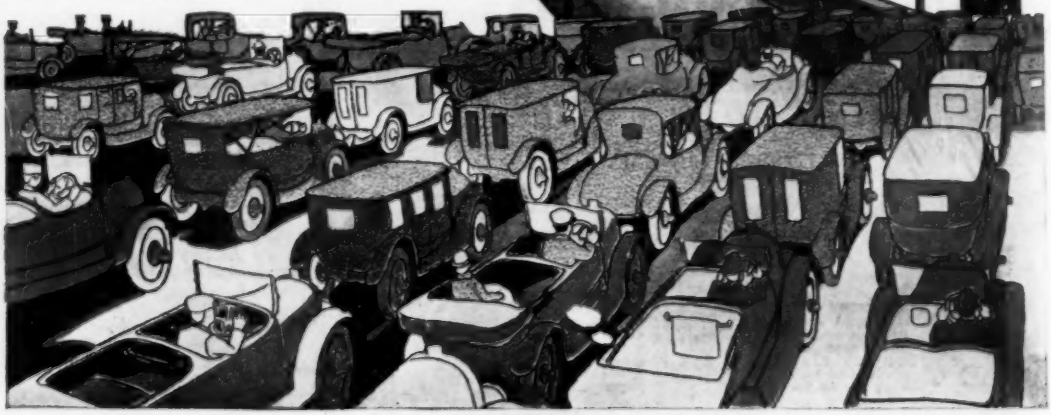




THE TIRE REPAIR BUSINESS

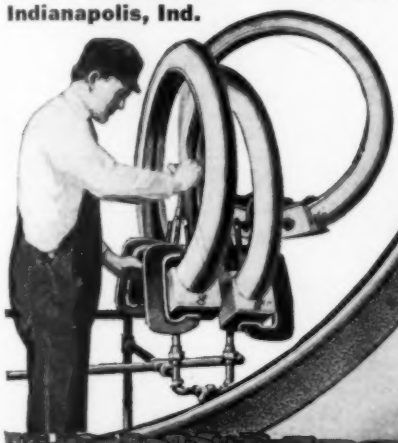
200 to Join Me Business

Enormous Profits

There is almost no limit to the profits you can make. When you get a Haywood machine, my interest doesn't lag—I never forget one of my boys. The minute you are ready, I'll show you how to add accessories to your line—to sell tires—the right tires—the kind the automobile owner wants and that gives him the best service. **I am prepared to help you.** If you so desire, I can fit you out with a complete stock of auto accessories—goods that we have demonstrated by test to be as good as the best. If there is not a Haywood Tire Repair Station in your town—if you see no metal sign of "The Man and Machine", write me personally and I'll tell you how to get started in this wonderful business. I'll help you—I'll make you a success. **Owners will come to you** for this service. Every automobile owner in your locality would listen to you—everyone of them would welcome you and your new shop. **Don't delay.**

EQUIPMENT COMPANY

Indianapolis, Ind.



I'll Train You in Ten Days, Either by Mail, or in My Free School

I'll teach you this business from A to Z absolutely FREE of charge. You can either come to Indianapolis at my free training school and learn this business first hand or I will train you successfully by mail. **I'll teach you how to secure the business**—how to hold it—how to develop expert technical knowledge of tires and sell customers all their supplies. When you step out of my school you are an expert—you know the construction—the inner mechanism of a tire and tire building. This knowledge is worth dollars to every automobile owner who draws up to your door, and with a little selling ability, and by following the course which we so carefully teach, **your success is assured.**

$45 Course FREE

For the training we give you we charge no tuition—not one penny when you come to Indianapolis to learn this business. You can try out the work—master all details, and you are under no obligations to us whatever. Our classes are always open—you can start any time. You can master the business first, know all about it—then get a machine, and you are ready to supply the demand for this National Tire Repair service.

Act Today Mail the coupon at the bottom of this page, or send a post card with your name and address. I will send you a FREE Book and tell you all about this wonderful proposition. I will send you positive proof of success—letters from men who are making big money in this business—who are giving Haywood Service in their various localities. What these men can do, you can too.

My free book, **"The Up Grade Road to Wealth,"** is an inspiration to bigger and better undertakings. DON'T WAIT, But Write Now.

Clip and Mail This at Once

Opportunity Coupon

Mr. M. E. Haywood, *Personal*
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Indianapolis, Ind.

Dear Sir: Please send me full details how I may start a Haywood Tire Repair Service shop and Sundry Supply Store in this locality. Also, tell me of your free school and full details of your exceptional offer.

Name .....

Address .....

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A Yearly Income For Every Man and Woman

Would you save $10.00 monthly for a few years if you felt assured it would earn for you an income of $1,500 to $2,000 yearly? This without a stroke of work on your part. ***You do not have to leave your present business or employment unless you choose.***

That is what a Dixie Estate planted to fancy grapefruit, oranges, and avocados should earn after it begins bearing. Past and present prices for these fruits prove this an EXTREMELY CONSERVATIVE ESTIMATE.

Picture for yourself a cozy home in balmy Florida, beneath beautiful skies, among flowering shrubs and luxuriant money-producing fruit trees. SUCH IS A DIXIE ESTATE, which awaits you whenever your inclination draws you to it.

SAVE NOW—SMILE LATER

We expect to plant at least 1,000 of these Dixie Estates this year and bring them into bearing for their fortunate owners. Will you be one? Think of this great and unparalleled opportunity!!!

$10.00 Monthly Is All You Have to Invest

You are not paying out or spending this money, but saving and investing it in a safe, money-making property—a highly developed fruit grove, which according to statistics should within a few years bring you a substantial income. Think what this really means to you—figure it out for yourself.

A Dixie Estate Will Insure Your Future

HERE IS THE ONE INVESTMENT which must appeal to every man and woman. Whether you are drudging along for a mere living wage—whether you are a merchant or farmer—or whether you have an independent income, you cannot afford to miss this chance to own a Dixie Estate.

Citrus fruit and avocado trees are long lived. This is not a temporary investment, but one which will bring a permanent income and continue to increase in value yearly. Compare this with any investment you have ever heard of—you will have to admit a similar offer has never before been made.

You Are Planting Money Rightly When You Invest in Dixie Estates

LOCATION—the best in all Florida, in the vicinity of Tampa—population, including suburbs, 70,000; growing so rapidly that it is destined to become the Los Angeles of the South. Dixie Estates will be near paved boulevards, railroad stations, schools and churches.

THE SOIL is as good as any of the best fruit land in all Florida. You could not buy better land for fruit growing no matter how much you paid for it.

THE CLIMATIC CONDITIONS are ideal for fruit growing. A more health giving, charming climate could not be desired.

THE TREES are the very finest obtainable—budded, pedigreed stock, grown by experts. Owning extensive nurseries and having years of experience developing Florida lands enables us to develop these Dixie Estates in the most approved, up to date manner.

Fancy oranges and grapefruit are well known money producers, when brought into bearing by expert, scientific methods.

The Avocado (commonly called alligator pear) is known as the aristocrat of fruits. The supply is so limited that in Northern Cities only the rich can afford to pay the extravagant prices it sells for. In December, 1915, Avocados sold in Chicago at the almost unbelievable price of $3.00 to $4.00 each. It is no doubt the highest priced fruit known.

ONE SINGLE AVOCADO TREE HAS PRODUCED $1,500 IN FRUIT ANNUALLY. When you realize what a wonderful fruit the avocado is you will understand why we claim that in Dixie Estates (which will contain 20% avocado, 40% grapefruit and 40% orange trees) you are offered a heretofore unheard of opportunity to derive a splendid YEARLY INCOME FOR A SMALL INVESTMENT. The proof is what you want!!! We have it and will gladly send it to you FREE.

YOUR DIXIE ESTATE receives expert and scientific care and attention for three years. A grove manager then takes charge if you do not wish to look after it personally. He will care for your Dixie Estate—its development and marketing of fruit indefinitely—for a percentage of the profits. You can receive the benefits of this truly marvelous proposition even if you never intend to live in Florida.

Every one of the several hundred thousand readers of this paper who mail us the coupon attached will want a Dixie Estate after reading our illustrated booklet giving detailed information—therefore act at once and be certain of obtaining one of the first locations.

MAIL THE ATTACHED COUPON TODAY. We will mail you FREE full information showing you how easily you can become owner of a splendid money making Dixie Estate in the most attractive, most healthful, and delightful district to be found anywhere in America.

FILL IN AND MAIL COUPON NOW

NORTH TAMPA LAND CO., P. M. 12-16
8th Floor Marquette Bldg., Chicago

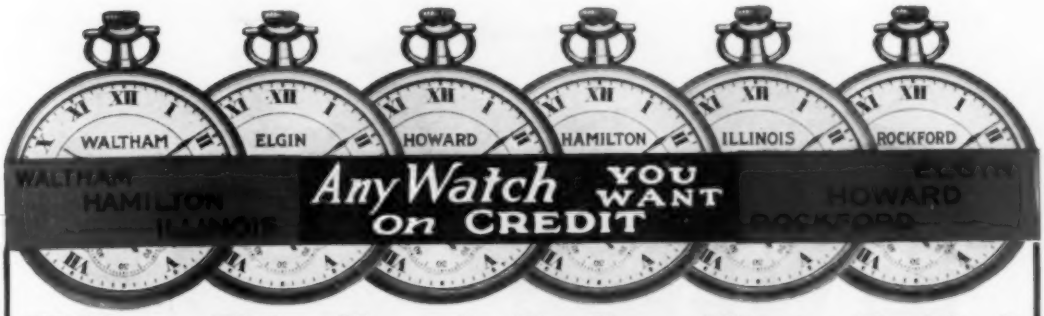
Please mail me detailed information and free Booklet on Dixie Estates. This does not obligate me in any way.

Name.....

Street No.....

City.....State.....

NORTH TAMPA LAND CO.
8th Floor Marquette Bldg. CHICAGO, ILL.



Waltham—Elgin—Howard—Hamilton—Illinois—Rockford

ANY MAKE—ANY SIZE—ANY JEWEL WATCH

ON CREDIT—PAY MONTHLY

The Watch or Diamond that persons wear indicates immediately their social and financial standing. Carry a cheap Watch and the world thinks of you as a failure because time and money are one. Pull a cheap Watch from your pocket and no power on earth can keep that Watch from fairly screaming **You are a Cheap Man.** Wear an imitation or fake Diamond and the only person you fool is yourself; your friends may be too kind or polite to tell you that they know it is a fake, but they will sneer behind your back and spread the news among all the neighbors.

Now my friends you cannot afford to wear a cheap Watch or fake Diamond, and in this age and generation there is no excuse for such little self-respect. With my easy monthly payment plan you can wear a Watch or Diamond that is a credit to yourself and does not belittle you in the eyes of the world. Pay a little each month while wearing a good Watch or a fine Diamond and never miss the money.

JOIN THE MILLER THRIFT CLUB
SAVE A DIAMOND
Pay a little each month and never miss the money

SEND NO MONEY WITH YOUR ORDER

Send no money with your order. I want you to see the watch or diamond before you pay one cent. **See it first** is my way of selling watches, because my line of watches is the best made, and I am proud of the fact that I can send out my goods on approval and make sales by this method.

30 DAYS' FREE TRIAL

After receiving and accepting any one of my watches, I want you to wear and test it for 30 days. If you are not delighted, pleased and satisfied at the end of 30 days, send it back at my expense.

MY PAYMENTS ARE SMALLER

Our capital and buying power are such that I can offer you terms that local jewelers could not meet with their limited capital. I can surely please you on terms.

WRITE FOR BIG CATALOG

Use the Free Coupon and write for my big catalog today. It's full of all the best watches, finest diamonds and exquisite jewelry, all sold on credit.

SQUARE DEAL MILLER, Pres.
MILLER-HOEFER CO.

786 Miller Building Detroit, Mich.

If you buy an imitation diamond the only person you Fool is Yourself

Christmas Gifts
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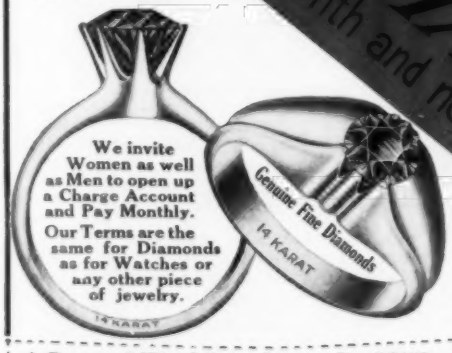


We invite Women as well as Men to open up a Charge Account and Pay Monthly.

Our Terms are the same for Diamonds as for Watches or any other piece of jewelry.

A Personal Word from Square Deal Miller

Because every account on my books represents a real friendship established on the basis of a "Square Deal," I have become known to my customers from coast to coast as Square Deal Miller. I have taught the public the real meaning of "dignified credit," and I have won the confidence of over a million customers by selling only the highest grades of diamonds, watches and jewelry on a Square Deal basis from start to finish.

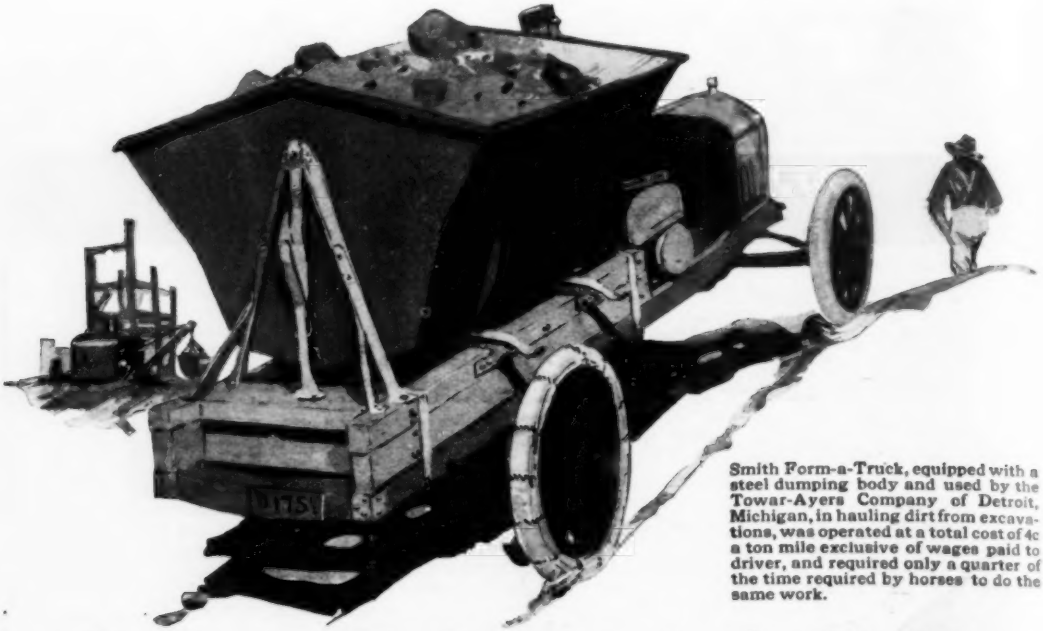
FREE CATALOG COUPON

Square Deal Miller, Pres., 786 Miller Bldg., Detroit, Mich.

Dear Mr. Miller — Please send me your large free catalog of Watches, Diamonds, etc., and explain your easy no money with order terms, also tell me all about your 30 day trial plan.

Name.....

Address.....



Smith Form-a-Truck, equipped with a steel dumping body and used by the Towar-Ayers Company of Detroit, Michigan, in hauling dirt from excavations, was operated at a total cost of 4c a ton mile exclusive of wages paid to driver, and required only a quarter of the time required by horses to do the same work.

The Lowest Hauling Cost in the World

The first Smith Form-a-Truck attachment was sold in Sumner, Washington, four years ago. This Smith Form-a-Truck has already run 18,000 miles at a total cost for repairs of $8. The average load hauled has been 2200 pounds and the Smith Form-a-Truck has been in service every working day.

Smith Form-a-Truck

$350

F. O. B. Chicago

Now Smith Form-a-Trucks are being bought in fleets, ranging from twenty or thirty up to two hundred by many of the largest concerns in the country.

The Smith Form-a-Truck attachment, combining as it does with any Ford or Maxwell power plant to make a fully guaranteed one-ton truck, has definitely established the value and service standard in the one-ton field.

It's acceptance by general business as the standard vehicle in service in which the loads average from 2,000 to 3,000 lbs. is shown by the fact that contracts for Smith Form-a-Trucks already total nearly 40% of the total production of trucks, all makes, for this year.

Smith Form-a-Truck Co.

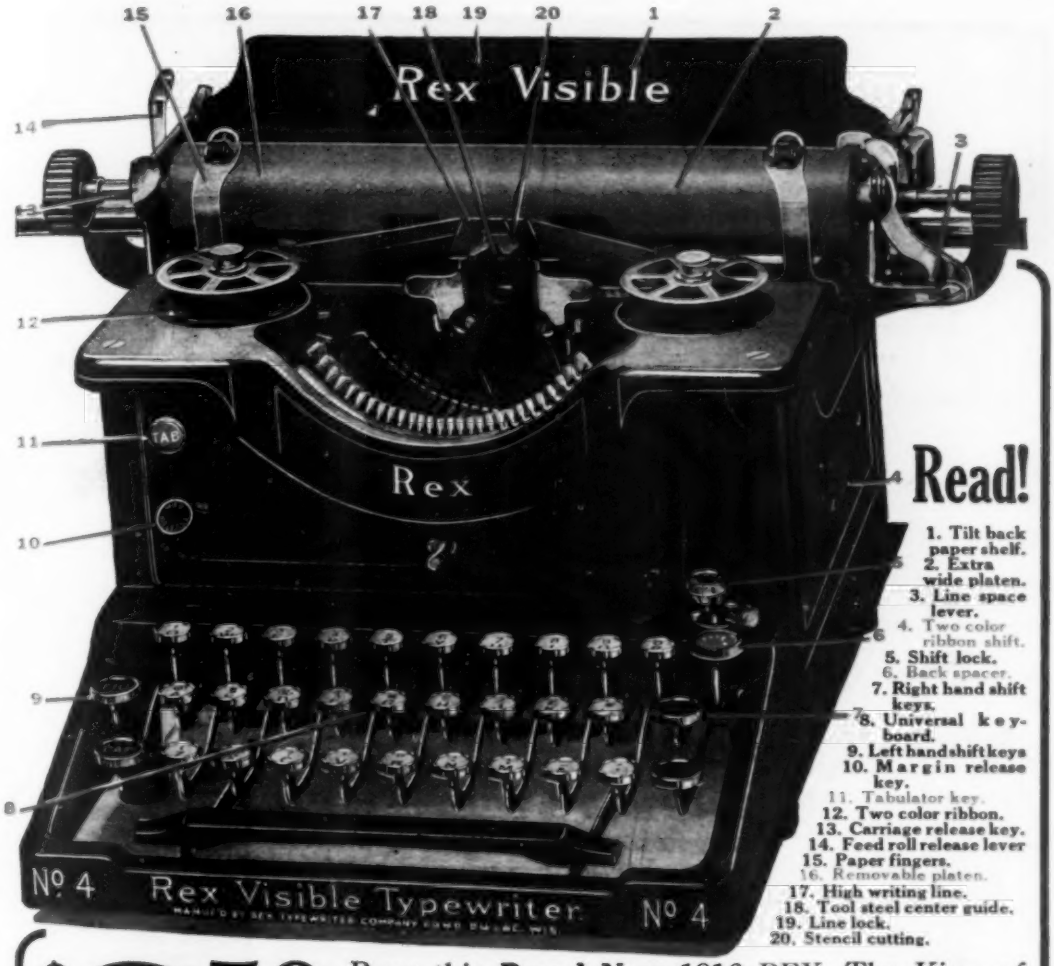
Executive Offices and Salesrooms, Suite 980, Smith Form-a-Truck Bldg.

1470 South Michigan Avenue, Chicago, Illinois

Eastern Branch
1834 Broadway, New York

Pacific Coast Branch
Pico and Hill Streets, Los Angeles

Southern Branch
120 Marietta Street, Atlanta



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1. Tilt back paper shelf.
2. Extra wide platen.
3. Line space lever.
4. Two color ribbon shift.
5. Shift lock.
6. Back spacer.
7. Right hand shift keys.
8. Universal keyboard.
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Here are the 4 Lines of MIAMI-MADE Bicycles

The MIAMI-MADE Racycle Pacemaker—A bicycle that you are sure to like. Built for comfort, yet strong enough to withstand the hardest wear.

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The MIAMI-MADE Flying Merkel Roadster—A strictly serviceable bicycle for hard usage in all kinds of weather and under all sorts of conditions.

Just tip it off to Daddy or Mother that you want a bicycle for Christmas, and tell them why.

It's the greatest developer for boys and girls that you could possibly get. It takes you to and from school; it takes you to the playground, and turns running errands into a pleasure. It takes you out into the open air, develops your muscles, lungs and brain.

If your bicycle is MIAMI-MADE you have a bicycle that you can be proud of, and all your friends will gather around and want to get one too. You will have *the* bicycle of the neighborhood.

We have been making bicycles for over 22 years. We know exactly what boys and girls like and want. There isn't any color, any model, any type of bicycle whatsoever that you want that you won't find in the MIAMI-MADE line of bicycles.

Shown on the *left* here is one of the many models of each of the four lines of MIAMI-MADE bicycles. The four lines are the "Racycle," the "Hudson," the "Miami" and the "Flying Merkel." On the *right* are just a few of the special exclusive features of MIAMI-MADE bicycles. Study them over. Then go to the dealer in your city who handles the line you think you'll like best. Pick out the model you like. Try it. Then ask your father or mother to get you *that* bicycle for Christmas.

Be sure they get you a MIAMI-MADE bicycle. These are the *only* kind you'll really want, even if you could see all the bicycles in the world, side by side, and could have your *pick of them all.* If there isn't anyone in your city who sells MIAMI-MADE bicycles, write us and we will send you catalogs. Whatever you do, be *sure* that the bicycle you *get* is MIAMI-MADE.

THE MIAMI CYCLE & MFG. COMPANY
1021-1037 Grand Ave. Middletown, Ohio, U. S. A.
Write for Catalog on the Miami-Made Bicycle You Want

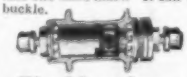
These are Special Exclusive Features of MIAMI-MADE Bicycles

The Crank Hanger

Stronger and heavier than ordinary crank hangers. Friction reduced to a minimum. Every part machined with unerring accuracy. Made of special steel, each part carefully tested and oil-tempered.

Four-Ply Hercules Frame Construction

Built of the finest seamless tubing. The reinforcement is carried back eight inches into the tube, with four plies of steel at the joint all brazed into one solid mass. It can't buckle.



The Musselman Positive Drive Coaster Brake

The only real coaster brake on the market. No springs to break. No parts to wear smooth and slip. Will withstand the severest strain. (8)

Send Only $1 For This ILLINOIS Watch

Your Dollar Back in a Month—if You Wish

To 10,000 Men Only

Once a year we buy 10,000 of these wonderful Illinois Watches. This 17-Jewel Model, with a 20-year Gold-Filled case.

We offer those watches at $13.75—terms $1 down and a year to pay. Our object is to open up 10,000 new charge accounts.

But we offer only 10,000. If you fail to get one by delay, you will have to wait a year.

How We Profit

This offer, of course, leaves us very slight profit. But we have an enormous Jewelry Department. And we supply two million homes with House Furnishings.

If we get you started—get you to open a charge account here—you will buy here all your life. That is why we offer this Watch bargain. It will last you a lifetime. And every time you look at it, it will remind you that you have an account with us.

Thirty Days' Trial

You know this Watch. The best jewelry concerns all over the country handle and recommend it. It is made by the Illinois Watch Co., Springfield, Ill.—one of the greatest and oldest watch concerns in the country.

But we send the Watch on trial. Wear it 30 days. If you are not satisfied with your bargain, send it back.

Send us only $1 when you order. If you don't like the watch, we will send the dollar back. If you do like it, send us $1 a month. That will give you over a year to pay.

No references required. We will gladly trust you. Express will be prepaid.

But don't wait. These 10,000 watches will go very fast. And this will be your only chance for a year to get such a fine-watch bargain. Send us the coupon now.

Spiegel, May, Stern Co

3750 Wall Street, Chicago

Our Price $13.75

Only $1 Down
A Whole Year to Pay

This watch has a **17-jeweled movement**—it is a perfect timekeeper. The price seems impossible. But we guarantee this watch to have 17 fine jewels, and to be a genuine Illinois watch, exactly the same as sold in jewelry stores.

The case is a **20-Year Gold-Filled Case.** That is, it is warranted for 20 years. It is open-face and a beauty. The back is handsomely engraved. It has a screw back and bezel, so it is positively dust-proof.

The watch is **guaranteed for 25 years.** We send with this watch this guarantee certificate. Think of that—only $13.75 for almost a lifetime of perfect watch service. The watch is a **perfect timekeeper.** No better timekeepers were ever made than the 17-jeweled Illinois. Every man who knows watches knows this.

If you want to sell this watch back to us, after 30 days' use, we will return every cent that you pay on it.

SPIEGEL, MAY, STERN CO.
3750 Wall Street, Chicago

I enclose first payment of $1, for which send, express paid, the 17-jewel Illinois Watch No. K4F 450 described in your advertisement. If I keep it I will pay $1 each month until $13.75 has been paid. If I return it within the 30-day trial period you are to send me back my $1.

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JEWELRY CATALOG FREE It contains everything that is new in watches, diamonds and jewelry—all sold on our easy credit plan. Just drop us a postal and it will be mailed you free. But don't fail to use the coupon and send us $1, as this wonderful watch offer will not be made again for a year. (1121)

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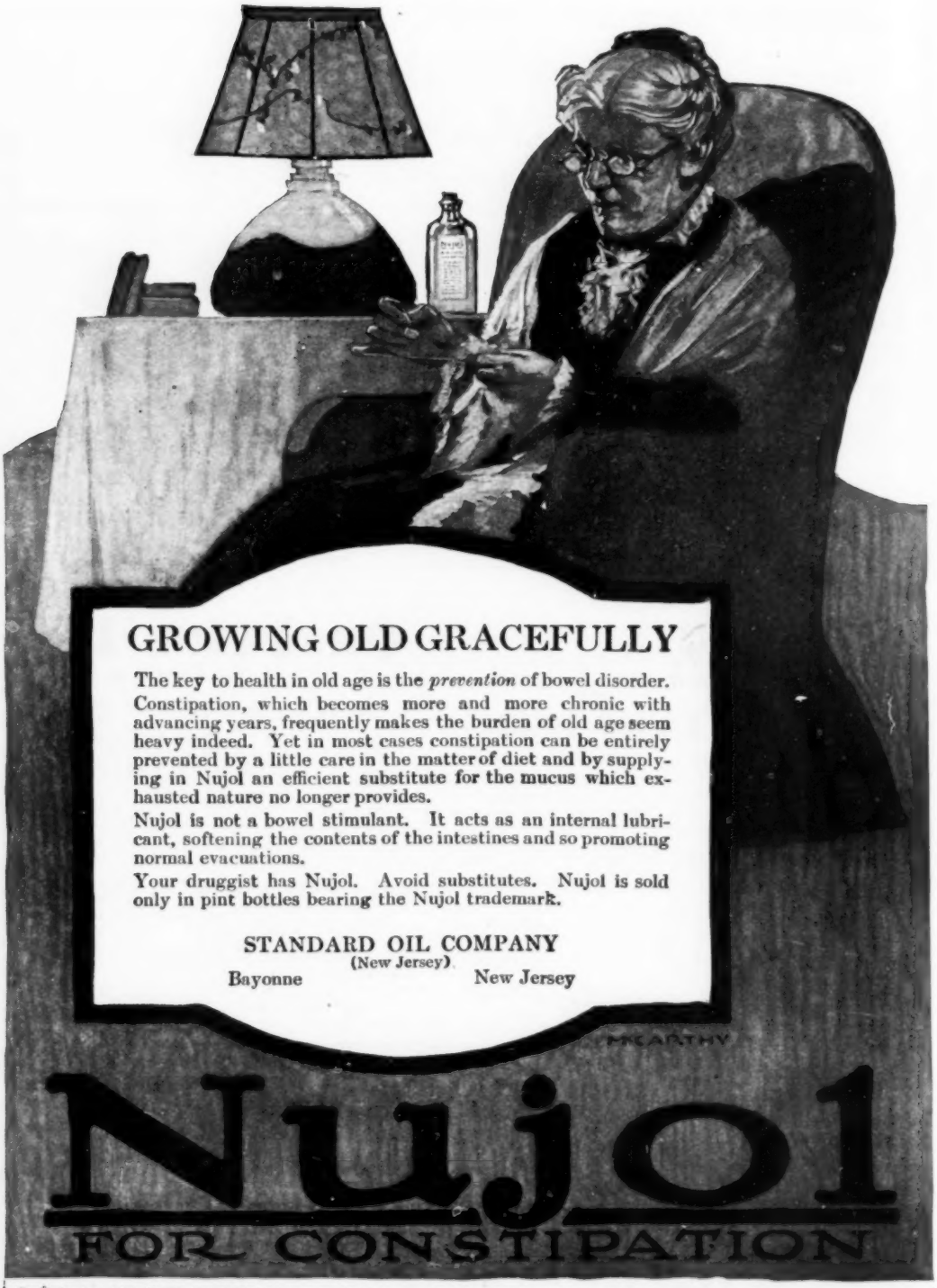

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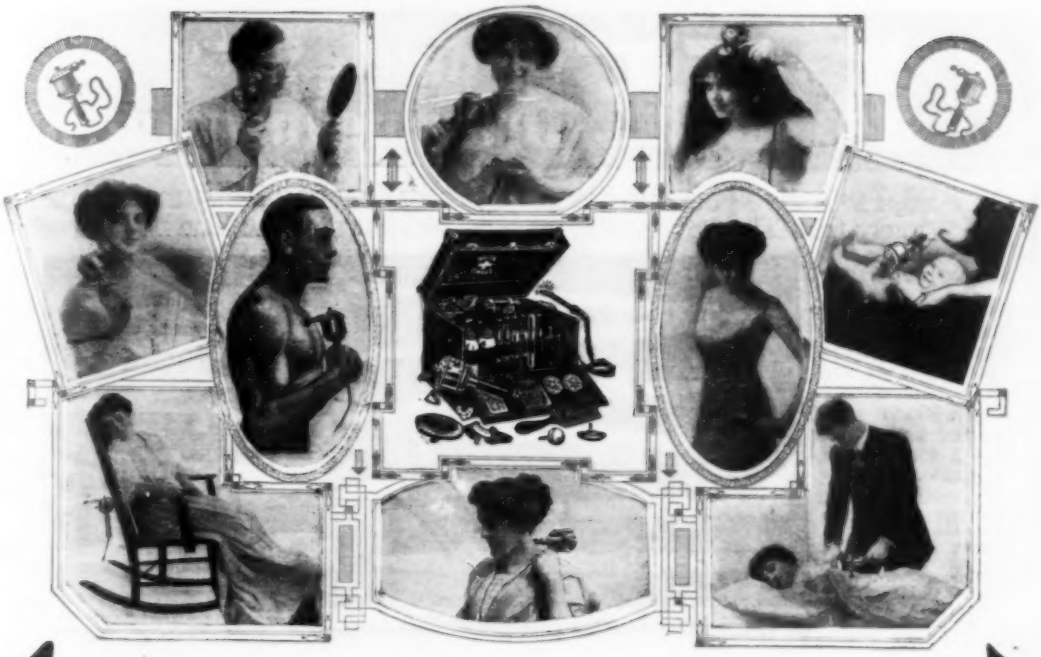

The Vigor of Youth

Strength that is more than mere muscular strength—the power of the stronger man now within your reach through vibration. Aren't there times when something is wrong—just a little something, that takes the edge off things—takes away the keenness of appetite and enjoyment. Usually there is just one thing wrong—circulation. The blood doesn't flow with the same tingle it used to. If you only knew how much vibration would do, you would not allow yourself to go another day without trying it.

Vibrating Chair Free

With the White Cross Electric Vibrator you can make a vibrating chair out of any chair—a chair which will give you the same results as the kind used in the biggest hospitals and sanitariums. You can not do this with any other vibrator. The nervous, irritable wornout man or woman who will spend a few minutes each day in the vibrating chair will receive wonderfully quick and lasting benefits.

For Women—Beauty and Health

Wrinkles go—also other disfiguration. It brings back the healthful glow of girlhood to pallid cheeks. Sagging muscles are strengthened and regain their beauty. Your complexion will be made clear. If you feel that you are too thin, vibration will build you up and cause the hollows to be filled out. Send the free coupon at once for the wonderful new book, "Health and Beauty."

Wonderful White Cross Electric Vibrator

is the result of years of work and experiment. It is mechanically perfect. If you have your home wired for electricity you can connect it up as easily as an electric lamp. If not, it will run perfectly on its own batteries. With our combination outfits you can get Nature's three greatest curative agents—Vibration, Galvanic and Faradic Electricity. Give yourself vibrating chair treatments. You can have them without extra charge.

Special Offer

For a short time only we are making a remarkable special introductory offer on the genuine White Cross Electric Vibrator. See it for yourself before you decide to buy. Send the free coupon for the Free Book and full particulars on this offer. Absolutely no obligations of any kind. Do not delay. **Write now—today.**

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My Electrical Dealer's Name is .....

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FREE Complete $15.00 Set of Drawing Instruments

YES, I will give you this complete set of drawing instruments absolutely free. They are regular working instruments—the kind I use myself and they do not cost you a cent.

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Pay as You Wish! What I want is the RIGHT KIND of men. Don't bother about expense. I will give you the working outfit free if you get in at once. I charge a very small fee for training you to be an experienced draftsman. You can pay the small cost as suits you best. My object is to develop experienced draftsmen.

Chief Draftsman Dobe
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The new Burlington—just out—distributed now for the first time—and on an astounding offer. The superb new model far surpassing everything of the past. 21 jewels, adjusted to positions, temperature and isochronism. New thin design—and all the newest ideas in gold strata cases to choose from. Send coupon today for full particulars.

And—we will send you this master watch without a cent down. If you decide to buy it—you pay *only* the rock-bottom price—the same price that even wholesale jeweler must pay.

$2.50 a Month!

Just think of it! $2.50 a month—less than ten cents a day will pay, at the rock-bottom price, for the New 21-Jewel Burlington—the master watch. This perfect time-piece will be sent to you, prepaid, without a cent deposit so that you can see and examine it for yourself. When you hold it in your hand you will realize what a gigantic value it is—and you will know how the Burlington brought the highest watch value within the reach of all.

21 Jewels

—adjusted to positions
—adjusted to temperature
—adjusted to isochronism
—adjusted to the second.

Runs almost 2 days in one winding.
On an Iron-clad guarantee.

Newest

up-to-date ideas in gold strata cases—the master products of the goldsmith's art are illustrated in colors in our new Watch Book. All yours to choose from. Write for the new watch book now

Catalog Now Off the Press

Write today for our new catalog. Read about this gigantic watch value. Learn about watch movements and why 21 jewels are the number prescribed by watch experts. Read what makes a watch movement perfect—and how the Burlington is adjusted to to the second. The watch book is free. Write for it today and get posted on watches and watch values. Send the coupon.

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Burlington Watch Co.
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Last chance at old prices. Date prices go up will be announced. Write at once for catalog.

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A keener edge than you ever felt. An edge that will flash through the stiffest, wiriest hair. Only a few strokes works marvels on any safety blade. You can't fail to get a lightning edge. You can't misuse a Stag Sharpener. A child can sharpen blades on a Stag as well as an expert. Makes old blades better than new. Makes new blades better.

Protect yourself.
A dull razor is dangerous to health and life itself. The Stag Sharpener is a health protection as well as a positive luxury in shaving. The truest, simplest, quickest, easiest safety blade sharpener on earth.

Complete $1 postpaid to you on this special offer.

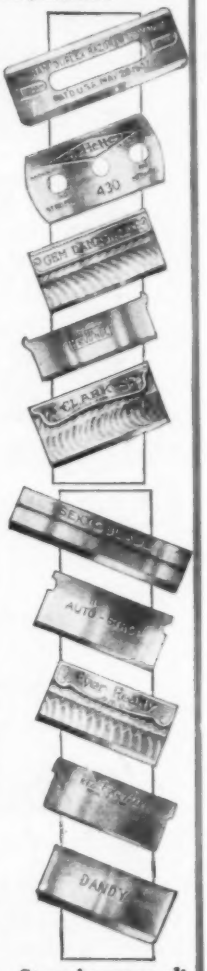
$1 Stag Sharpener
with barber's hone and strop complete, on our money back guarantee

Sharpen Any Blade

HIGHEST AWARD RECEIVED AT PANAMA PACIFIC INTERNATIONAL 1915 EXPOSITION

A Stag Sharpener is the only safety blade sharpener ever awarded the grand prize at an International Exposition.

Positively gives new blades a better shaving edge. Puts the oldest, dullest blades in lightning edge condition. Gives new blades a better edge than when they come from the factory. You can never know the delights of shaving with a positively perfect razor edge, until you sharpen your own blades with the Stag Sharpener. The quickest way. The truest way. The surest way. The safest way. The easiest way. The wheels of the sharpener guide the angle. Nothing to adjust. Nothing to get out of order. Practically lasts a lifetime. Our new patented feature makes the Stag more desirable than ever. Stag Sharpeners are used around the world. The new patented simplified sharpener is more popular than ever. Complete outfit includes heavily nickeled sharpener, barber's hone and strop, in neat box, suitable for traveler's kit. Complete, postpaid to you only $1. Send now.



Stag sharpens all safety blades

Sent on FREE TRIAL

Try a Stag Sharpener at our risk and at our expense. Use it ten days free. Use it at our risk and at our expense. Then if you are not delighted, send it back and get your money back in full. We gladly assume the risk and welcome your order on this liberal, free trial, money back guarantee. Send only $1 today.

Hone and Strop Free

With every Stag Sharpener we send a barber's hone and strop free. It is a part of the Stag outfit. The new patented, simplified improvements in the perfected Stag Sharpener and a new broad-width barber's hone and strop in attractive kit-box, all complete only $1. Two minutes after you open the box, you can enjoy the first soft, smooth, silent shave with a lightning Stag edge. You will wonder how you ever got along without a Stag. It is the most suitable and welcome Christmas gift for any man. Send only $1 today.

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Write to us for special terms to dealers. The Stag is the quickest and best seller on earth. Get the benefit of this advertising and our Dealer Service.

Special $1 Coupon

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GENTLEMEN: Wishing to take advantage of your 10 days' free trial and money-back guarantee, you may send a Stag Sharpener, hone and strop complete. I am sending herewith $1.

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Send Today Enclose only $1, money order, draft, dollar bill, or check. Send today and make a comfortable shave for yourself. You need a Stag Sharpener. Clip coupon, put in $1 and get it by return mail.

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Prevent "wet weather" discomforts.
Relieve coughs, colds, throat trouble.

In "Yellow Box"—5c

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MENTHOL CANDY **COUGH DROPS**

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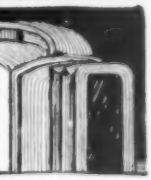

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Write immediately for schedule showing the places and dates of **THE COMING GOV'T** examinations. Don't delay. Every day you lose means the loss of just so much coaching before the rapidly approaching examinations.

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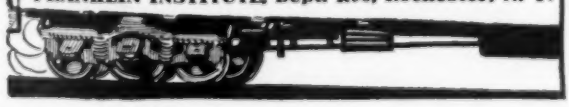

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Write Plainly
Use It Before You Lose It

COUPON

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Kindly send me, without any obligation whatever on my part and entirely free of charge, (1) a full description of the position checked below; (2) Sample examination questions; (3) Free copy of copyrighted book "Government Positions and How to Get Them;" (4) A list of U. S. Government Jobs now easily obtained; (5) Directions telling me how to get free coaching for the position checked.

____ Railway Mail Clerk ($900 to $1800)	____ Customs Positions ($800 to $1500)
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____ Bookkeeper ($800 to $1800)	

Name .....

Address .....

PAIN AND ITS RELIEF

By Dr. E. L. Abogado

OURS is not a nation of Stoics. We are not indifferent to pain. We abhor it. Be it ever so slight, we fume and fret until we get rid of it, because it annoys us—it interferes with our work and pleasure.

And if pain is severe — the pain of rheumatism, sciatica, neuralgia, gout or some acute nerve derangement, we are apt to regard it as sufficient excuse for a hurried call at the doctor's office.

In the aggregate, the American people probably suffer more annoying, useless pain, than any other people on the face of the earth.

That is because of the intensity of our complex civilization—the strenuosity of our effort to secure dollars—the rapidity of our pace in pursuit of pleasure — the indulgence of our appetites.

Rich, poor, saint, sinner, stray from the straight, narrow path of nature's immutable law, until Pain is so universally present, so much of the time, that one can scarcely find a home, in any walk in life, in all this broad land, that is unacquainted with pain. Pain is so common that to see a frown is to bring forth the question, "Are you in pain?"

Despite the almostuniversal prevalence of pain in its various manifestations, it is a curious fact that some people dread to assume the responsibility of attempting to relieve themselves of it, almost as much as they dread the pain itself.

How fortunate therefore it is, that there is a simple and reliable remedy, which, because of its power to bring sure and speedy relief from pain in any form, may be termed a "pain specialist."

Ready to minister to the need of every one who suffers pain, regardless of its primary cause, anti-kamnia tablets await your call at every drug store.

The development of most diseases is heralded by pain and fever and while in no sense a cure-all, anti-kamnia tablets are exceedingly useful in a large number of diseases.

That is because these tablets are quite as effective as reducers of fever as they are as relievers of pain.

Therefore, they have their use in any disease where pain or fever exist, either together or separately.

It is gratifying to note that prominent practitioners everywhere have prescribed anti-kamnia tablets with most satisfying results in the treatment of all kinds of headache, migraine, neuralgia, la grippe, and its after-effects; as a sedative in indigestion, gastralgia, dyspepsia, hysteria and insomnia; as an antipyretic in intermittent and malarial fevers and bronchitis and for the severe pains of toothache, sciatica, rheumatism and gout.

You know full well when you are in pain or when you feel feverish and it doesn't require a physician's advice to tell you so — nor is a prescription needed to take anti-kamnia tablets. They may be obtained in any quantity desired.

You'll find it no longer necessary to take your every ache and pain to a doctor, when you have once learned of the quick relief afforded by anti-kamnia tablets, the pain specialists, at the corner drug store.

Immediate Results

Trying to quit the tobacco habit unaided is a losing fight against heavy odds, and means a serious shock to your nervous system. So don't try it! Make the tobacco habit quit you. It will quit you if you will just take Tobacco Redeemer according to directions.

It doesn't make a particle of difference whether you've been a user of tobacco for a single month or for 50 years, or how much you use, or in what form you use it. Whether you smoke cigars, cigarettes, pipe, chew plug or fine cut or use snuff **Tobacco Redeemer** will positively remove all craving for tobacco in any form in from 48 to 72 hours. Your tobacco craving will begin to decrease after the very first dose—there's no long waiting for results.

Tobacco Redeemer contains no habit-forming drugs of any kind and is the most marvelously quick, absolutely scientific and thoroughly reliable remedy for the tobacco habit.

Not a Substitute

Tobacco Redeemer is in no sense a substitute for tobacco, but is a radical, efficient treatment. After finishing the treatment you have absolutely no desire to use tobacco again or to continue the use of the remedy. It quiets the nerves, and will make you feel better in every way. If you really want to quit the tobacco habit—get rid of it so completely that when you see others using it, it will not awaken the slightest desire in you—you should at once begin a course of **Tobacco Redeemer** treatment for the habit.

Results Absolutely Guaranteed

A single trial will convince the most skeptical. Our legal, binding, money-back guarantee goes with each full treatment. If **Tobacco Redeemer** fails to banish the tobacco habit when taken according to the plain and easy directions, your money will be cheerfully refunded upon demand.

Let Us Send You Convincing Proof

If you're a slave of the tobacco habit and want to find a sure, quick way of quitting "for keeps" you owe it to yourself and to your family to mail the coupon below or send your name and address on a postal and receive our **free** booklet on the deadly effect of tobacco on the human system, and positive proof that **Tobacco Redeemer** will quickly free you from the habit.

Newell Pharmacal Company
Dept. 300, St. Louis, Mo.

Mail Coupon NOW for FREE Booklet

NEWELL PHARMACAL CO.,
Dept. 300, St. Louis, Mo.

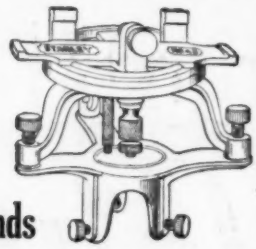
Please send, without obligating me in any way, your free booklet regarding the tobacco habit and proof that **Tobacco Redeemer** will positively free me from the tobacco habit.

Name .....

Street and No. .....

Town ..... State .....

Stanley Tools



Stanley Improved Leveling Stands

A Stanley Level Stand, used in connection with a wood or iron level, and a pair of level sights will be found in many cases a very satisfactory and inexpensive substitute for the more expensive surveyors' instruments.

By its use one can readily determine levels from a given point to one at a distance, such as locating or setting the profiles for foundation work, ascertaining the proper grades for drains, ditches, etc.

It can be placed on a stake or crow-bar and adjusted to a horizontal position even though the stake or crow-bar may not be exactly perpendicular.

A Thoroughly Practical Tool

Price of Stand with a 12-in. metal level and a pair of level sights **$4.50**

Price of Stand only—adapted for either wood or metal level **$2.00**

SEND FOR SPECIAL CIRCULAR

STANLEY RULE & LEVEL CO.
NEW BRITAIN, CONN. U.S.A.

A complete line of appliances for the transmission of Power. Anything from a bolt to a complete mill or factory outfit. Send for catalogue. Largest Manufacturers of Pulleys in the country.

W. A. Jones Foundry & Machine Co. 1400 N. North Ave. CHICAGO

Use Water Power for Hard Work $2.50 UP

The Divine Red Devil Water Motor

will operate washing machines, sewing machines, small lathes, small dynamos, do grinding and polishing. No muss—no fuss—nothing to get out of order.

A Simple, Durable, Economical Motor

that costs little or nothing to operate. Improved bucket-wheel construction exactly like big turbines. Power for small shops, mechanics, grocers, doctors and dentists.

Money back if not entirely satisfied. Write for FREE Booklet. Mention size of pipe and water pressure and work to be done.

Agents Wanted

Divine Water Motor Co., Dept. P, Utica, N.Y.

A Constant Water Supply For Your Farm Home

Don't depend on a windmill or the back-breaking hand pump to fill your water tank. It's more reliable and economical to install a

RIFE RAM

and be sure of a constant supply of fresh water, without fuel or attention. The Rife Ram operates by the flow of any stream having a fall of 3 feet or more and a supply of 3 gallons or more per minute. Will maintain air pressure system. Simple to install. Over 11,000 in use. Satisfaction guaranteed.

Write today for catalog and free estimate

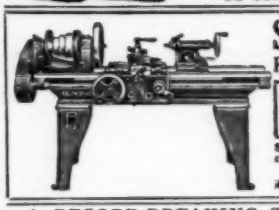
RIFE ENGINE CO.
3131 Trinity Building NEW YORK

CRESCENT Wood Working Machinery

is the standard by which other machines are judged, as **Crescent** is the most often referred to in making comparisons.

Ask today for a copy of 1916 catalog telling about our line of band saws, jointers, saw table, planers, disk grinders, shapers, borers, mortisers, planers and matchers, universal wood workers, variety wood workers, swing cut off saws

The Crescent Machine Co.
93 Columbia Street, LEETONIA, O.



South Bend Lathes

For the Machine and Repair Shop

How to Run a Lathe
A 50 cent book for 10 cents. Postpaid, stamps accepted.

Straight or Gap Beds. Send for free catalog giving prices on entire line.

SOUTH BEND LATHE WORKS
423 Madison St., South Bend, Ind.

A RECORD-BREAKING TOW—An unusual towing feat was that performed by the oil-tank steamer "Richmond" which in 496 days towed a tank barge 75,000 miles without mishap. The vessels, of a combined displacement of 15,000 tons, left San Francisco for New York via the Panama Canal, in February, 1915; later

Portable Cases

FOR TOOL MAKERS AND MACHINISTS

Twelve styles, felt lined drawers, solid brass trimmings, best of material, beautiful finish, low prices, satisfaction guaranteed. Ask for booklet of cases built for service.

The Pilliod Lumber Co.
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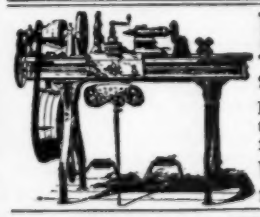

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9 to 18-inch Swing

List price $75 and up according to size. When ready to buy send for Lathe Catalog and prices.

W. F. & John Barnes Co.
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Saws Wood and Soft Metals

Indispensable and most economical. For shop or private use. Full description and circular on request.

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Own This New Wrench

Don't waste time hunting for a solid wrench of the right size —save time and trouble —own a handy

Crescent Double-End Adjustable Wrench

Drop forged from our own formula steel, specially heat treated and oil tempered. Jaws cannot stick because bearings are tooled to fit perfectly. The same quality throughout as the famous **CRESCENT** single-end wrench.

Comes in two sizes: 6-8, with a capacity of ¾ and 15-16 in., $1.25; and 8-10, capacity 15-16 and 1 1/8 in., $1.50

Every **CRESCENT** Wrench is guaranteed satisfactory or you get your money back. If you can't buy **CRESCENT** Double-End Wrenches from your hardware or auto accessory dealer, we will send you the size you need on receipt of price.

Catalogue of CRESCENT Tools Free.

THE CRESCENT TOOL COMPANY
JAMESTOWN, NEW YORK

made 14 trips across the Atlantic and the war zone, and then passed around the Cape of Good Hope to Shanghai, China. The longest no-stop tow was from New York to Singapore, a distance of 14,000 miles, which was made in 62 days. The only overhaul needed after the long trip was cleaning of the boilers.

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For Up-to-Date TOOLMAKERS and MACHINISTS

We carry the finest and most complete line of mechanics' toolcases and tools in the country. We guarantee to please you or refund money. **Write for free catalogue.**

J. M. WATERSTON
75 Woodward Ave., E., Detroit, Mich.

SAMPLE 75c

THE SPEEDY Stitcher

The greatest invention with which the unskilled man can repair leather goods or any heavy material. Needles and thread are inside the handle. FAST SELLER.

Agents Wanted Foreign trade solicited. Advertising circulars in different languages.

Stewart-Skinner Co., 26 Hermon St., Worcester, Mass., U. S. A.

AGENTS—$40 A WEEK!

R. M. King Made $45 in 6 Days

15 IN ONE

Forged steel. Patented. Low priced. Sells to auto owners, farmers, mechanics in the shops and the home. Not sold in stores. No competition. Sales easy. Big profits. Ten-inch sample to workers. Write at once. **THOMAS TOOL CO., 3248 East St., Dayton, Ohio**

Make a Start On That Kit of Tools

For years you have been wishing you had a complete set of precision tools. You are tired of borrowing! *Start today* toward getting a set of your own.

Brown & Sharpe Tools

LAST A LIFETIME

Buy one B. & S. tool each month and in a short time you will have a kit you'll be proud of—the kind the best workmen use.

B. & S. Tools are accurate, durable and reliable. They are made by skilled workmen and carefully finished, having no rough burrs, sharp edges, etc. Their use insures accurate work and protects you against costly errors.

See your hardware dealer today and get our catalog No. 27 showing over 1000 varieties of machinists' tools.

Brown & Sharpe Mfg. Co.
PROVIDENCE, R. I., U. S. A.

It is Automatic

in its feeding. The "Yankee" Chain Drill No. 1500 has Automatic Ratchet-and-Friction Feed. Saves drill points. Cuts down time of working. Does away with hand feeding.

Chain is quickly tightened and drill set with a few turns on Friction Feed. A movement of a little lever, from upright to horizontal, and the Drill is on the Automatic Ratchet Feed, feeding uniformly and without further attention, and under exactly the right pressure for large or small drills until the job is finished.

As carefully constructed as other "Yankee" tools. Three-jaw chuck. Holds round shank drills to half-inch diameter. Square thread, steel feed screw insures durability.

No. 500 is made with two-jaw chuck.

"YANKEE" CHAIN DRILL

No. 1500

$3.25

9¾ inches long

Weighs 3¼ pounds

Write for "Yankee" Tool Book, showing styles of "Yankee" Ratchet, Breast and Hand Drills and other "Yankee" Tools.

NORTH BROS. MFG. CO.
PHILADELPHIA

"YANKEE" TOOLS
Make Better Mechanics

Please Mention Popular Mechanics

Do This

Before you put a tool away treat it to a little 3-in-One.

Oil the action parts of automatic tools. Wipe all tools and their wooden handles with a soft cloth moistened with 3-in-One. Then you'll find your tools in perfect working condition the next time you use them. This is a small thing to do, but every tool user will find it produces great big results.

3-in-One

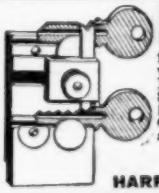
is the one right oil for tools. Lubricates automatic drills, screw-drivers, brace and bits to perfection. Never gums or collects dirt. Prevents rust on edge tools. Makes saws work much easier. Cleans and polishes the wooden handles. Try it.

3-in-One is sold at all stores—in 25c Handy Oil Cans and in 10c, 25c and 50c bottles.

FREE—Generous sample of 3-in-One Oil and Dictionary of Uses—both free for the asking.

Three-in-One Oil Co.
42CNG. Broadway New York

CURIOUS COINS AND PAYMENTS—Various instances of curious forms of payment, says the Christian Science Monitor, are mentioned by a German newspaper apropos of the issue of iron coins in Germany. Not the least original of these was that adopted by the inhabitants of one of the Friendly Isles on the occasion of a concert given during the '60s by Mlle. Zelie, a singer. The local chieftain paid for his seat with a beautifully engraved bottle made out of a cocoanut, while the contributions of the general public consisted of pigs, tur-



DUPLICATE KEYS

for all Pin Tumbler Locks made in one minute with Harrison M.I.P. Key Filing Machine. No misfits. Thousands in use. $3.00 net. Special diamond-shaped files for angular cut keys, 40c each; 3 for $1.00. Harrison C.K. Key Clamp duplicates all common keys without a caliper. Price, **$1.00.** Parcel post prepaid. *Money returned if not satisfactory.*

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HARRISON & CO., 81 New St., New York

MECHANIC'S POCKET SECRETARY

15c

Constructed of finest steel. Just push the button and out comes the article you require. Worth $1.00. Postpaid

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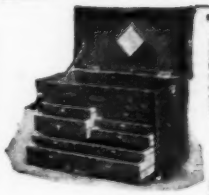
Get One To-day

10 in 1 — Adjustable Pencil, pen, paper knife, ink eraser, pencil sharpener, nail file and cleaner, mechanic's marking point, fine compass with screw attachment, foot rule.

ARDEE CO., Dept. 750, STAMFORD, CONN.



ToolCases for Toolmakers and Machinists

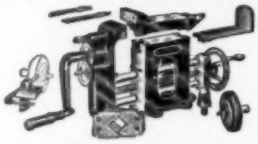
Keep your tools orderly arranged in a Gerstner Portable Tool Case. There's a place for every tool in one of the felt lined drawers. Every up-to-date mechanic needs one and you'll find our Cases the best built, neatest and most practical on the market. We guarantee to please or refund all money. Write for our free booklet

H. Gerstner & Sons

Mfrs. of Mechanics' High Grade Tool Cases
308 Columbia St., DAYTON, OHIO

A Wonderful Combined Tool

is this **STEWART HANDY WORKER**



It combines: A strong andpowerful vise, steel faced; a steel pipe vise for up to 1½-inch pipe; big, sturdy anvil; cutting hardie; corundum grinding wheel 5"x1", 2 speed drill press; 3 speeds, direct, 4 to 1 and 16 to 1. Weighs, boxed, 90 pounds; price f. o. b. Chicago, $12.50 Send $2.00 and pay balance when outfit arrives. All money back if not highly pleased. It's a marvelously valuable outfit. Write for circular.

Chicago Flexible Shaft Co.
A617 N. La Salle St. CHICAGO

An Indispensable "Red Devil" Plier

For the Tool Kit or Work Bench

An 8 inch combination plier with adjustable jaws and screwdriver in handle. Made for handling bolts, nuts, pipes, wires, screws, etc. Nickel plated finish; scientifically shaped handles made to fit the hand. Sample mailed for 50c. Style No. 925.

Tool Booklet Free

Smith & Hemenway Co., Inc. 97 Chambers St. NEW YORK CITY

keys, chickens, cocoanuts, pineapples, bananas, melons, and oranges. In a letter to a friend the artist wrote: "They tell me a speculator from the neighboring island will come tomorrow and offer me a lump sum for the goods. Meanwhile we are giving the melons to the pigs, and the turkeys and chickens are gobbling up the bananas and oranges, so that I am having to sacrifice the vegetable portion of my takings to the animal."

Drop Forged Compound Lever **Snips $1 to $3.50** FOR HIS XMAS

Made for hardest service. Highly tempered crucible steel, drop forged. Cuts keen. Holds the edge. Cuts 18-gauge metal at point easily—cutting power three times that of ordinary straight snip. For sale by dealers or sent postpaid in United States at these prices:

7-inch,	$1.00	12 inch,	$3.00
8-inch,	1.50	14-inch,	3.50
10-inch,	2.25		

BARTLETT MFG. CO.
20 Lafayette Ave. E.
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"Interlox"

MASTER SLIDE RULE

SAVES TIME, TEMPER AND TROUBLE

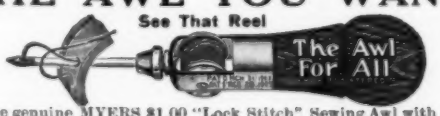
The **Only** Interlocking Rule made—and the **Only** one whereby inside measurements of doors, windows, etc., can be taken rapidly and accurately. Also superior to all others for outside measurements of walls, ceilings, etc. If your hardware dealer hasn't this Rule, send us his name and 18c per foot (in any length from 2 to 8 ft.) and it will be sent prepaid.

Liberal Proposition for Dealers and Agents

DAHL MFG. CO., 51P E. 42nd St., NEW YORK

THE AWL YOU WANT

See That Reel



Is the genuine MYERS $1.00 "Lock Stitch" Sewing Awl with the exclusive feature. See thread reel in front of handle under the finger tips. Natural tension. Sews heavy or light material, diamond point, full grooved needles used to protect the thread when sewing.

C. A. MYERS COMPANY, 6339 University Ave., Chicago, Illinois

Have You a Starrett Combination Square?

It is one tool that every carpenter, cabinet maker and amateur mechanic should have. It helps you to do better work and faster work—it can be used as a rule, square, level, bevel, and even as a depth gage, height gage, or marking gage. Isn't that a tool worth having?

Starrett Tools

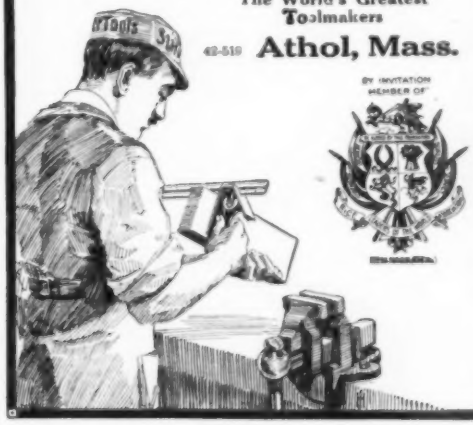
are all accurate and well made—they will help you in laying out and measuring your work. Among the fine tools we make for carpenters and houseowners you will find rules, squares, steel tapes, scratch gages, cabinet scrapers, nail sets, trammels, compasses, etc. You can see them all at any good hardware store.

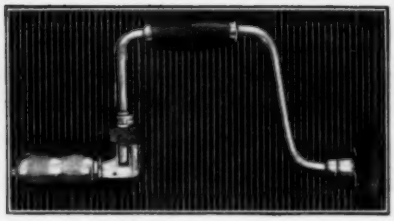
Write for free catalog No. 21A.P., describing the full line and giving prices

The L. S. Starrett Co.

The World's Greatest Toolmakers

42-519 **Athol, Mass.**





Choose a Tool for Your Present

to the "handy man" of your house or let it be known that is your choice if you are that man.

Any Millers Falls tool will give you years of usefulness and pleasure. Here is

MILLERS FALLS
BIT BRACE No. 732

one of the most popular tools made that gives the maximum of service at a moderate cost.

Covered ratchet gets into out-of-the-way places—ball-bearing head gives you great boring power. Chuck takes all square shanks and round shanks up to half inch.

Coco bolo handles—handsomely nickel plated—makes a tool of striking appearance.

Send for catalog and we will include Handbook of Mechanical information free on request.

MILLERS FALLS CO.
"Toolmaker to the Master Mechanic"
Millers Falls, Mass.
New York Office, 28 Warren St.

THE BEST AMERICAN MAKE
ARROW COLLARS

INDIAN MYTH EXPLAINS SALTNESS OF GREAT SALT LAKE—Copper relics of a prehistoric age have been discovered in a mine near Salt Lake City. Among them was a marble tablet decorated with crude drawings and hieroglyphics apparently of Indian origin. One story on the tablet has been interpreted as concerning a black-eyed Indian princess, called No-ni-shee, "the maid who put the salt in Great Salt Lake" by her weeping.

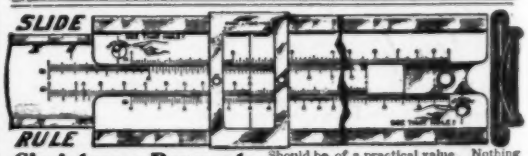
Mends All Metals Permanently

A real metal solder, complete in collapsible tube — Ready for quick repairs.

SOLDERALL

Used by largest manufacturers and electricians. A recognized necessity for the home. Useful Christmas gift. Tube and torch in handsome box sent prepaid for $1.25. **Dealers write for prices.**

Tube 25c — Solderall Company, 125 Sussex Ave., Newark, N. J. — Torch $1.00



Christmas Presents Should be of a practical value. Nothing would be more appreciated than a **Richardson all metal slide rule**, scales white celluloid impregnated (**by means of our patented process**) into the metal with black lines. Guaranteed not to shrink, warp, bind, or rust in any climate. Ten inch rule and 64 page book, 160 illustrations, for mechanics, electricians, engineers, and those who have to do with technical problems, price, $3.00, leather case, 50c extra. Merchants' slide rule, **special** for instantly computing interest cost, selling price, and calculating net amount from list, thru a string of various discounts, time keepers, and lumber merchants' commercial problems made easy, price, $5.00. Save your husband, son, or daughter's brain by ordering now. **Last you forget.**
GEO. W. RICHARDSON, 4218 West 24th Place, CHICAGO

One of the World's finest trains running between Chicago and Los Angeles makes a "mile a minute" clip with a Famous "Santa Fe Special" Watch in the cab. Whitcomb says: "BEST WATCH I EVER CARRIED."

21 JEWEL "Santa Fe Special" $3.50 A MONTH

The REAL triumph of watch manufacturing—SEE this watch FIRST. **Sent without one Penny down.**

Write for FREE Watch Book Today— shows newest watch case designs in 4 colors. READ the so-called SECRETS of watch making. READ how you can save from ONE THIRD to ONE-HALF of your money—Buy "Direct," cut out the wholesale jeweler's profit.

Buy The BEST RAILROAD Watch The Famous "Santa Fe Special"

—the **one** watch "That's Guaranteed for Life," thin model, **all sizes, adjusted** to positions, **adjusted** to Isochronism, **adjusted** to temperature, **adjusted** to the second.

EASY PAYMENTS TO SUIT YOU—Write today—your name on a postal brings the FREE watch book.

SANTA FE WATCH CO., Dept. D-6 Topeka, Kan.

It is reported that the Chinese government is about to establish a factory for the manufacture of aeroplanes. The services of two American and two German engineers are said to have been engaged for the factory, which is to be situated in Honan.

SUPERIOR SINCE 1904

Over 100,000 in Use

Mostly sold through recommendation. For PERSONAL DESK or GENERAL OFFICE. It checks mental calculations. Buy through your Stationer. Write for 10-day trial offer.

E. GANCHER, A. A. M. CO.
148 Duane Street, NEW YORK

AGENTS WANTED

"I Would Not Part with it for $10,000"

writes an enthusiastic, grateful customer. "Worth more than a farm," says another. So testify over 100,000 **Men** and **Women** who have worn it.

The Natural Body Brace

Develops erect, graceful figure. Brings comfort, health, strength and pep.

Makes You Feel Good and Look Good

Replaces and supports misplaced internal organs; reduces enlarged abdomen; straightens shoulders; relieves backache, curvatures, nervousness, ruptures, etc., in **both sexes.** Fine after operations. Write today for illustrated booklet, measurement blank and our very liberal **free trial** proposition. **HOWARD C. RASH, Pres. Natural Body Brace Co., 223 Rash Bldg., Salina, Kan.**

Only 50 Cents

or only $1 for both these splendid genuine leather gifts, *postpaid.*

The "American Bankroll" combination Billfold, Coin Purse and Cardcase of fine, genuine black leather. A *Dollar* article for only 50c. ($5.40 a doz.)

The "First National" Garter Purse. *Safest Bank* in the country. For both women and men. Size 2 1-2x3 1-2 inches. Two roomy pockets. Made of genuine soft brown leather. 50c, postpaid. ($5.40 a doz.)

Any Name Stamped In Gold FREE on either or both of the above articles. Extra lines of gold stamping, 20c; fraternal emblems, 25c extra. Packed in fine gift boxes. Send money order or *postage.* Order both of them. With annual catalog of *Guaranteed Leather Goods and Novelties FREE.* Business men, banks, etc., should write for quantity prices.

U. S. LEATHER GOODS COMPANY, Mfrs., 5247 Ravenswood Ave., Dept. 2-C, CHICAGO

Extra Lines Gold Stamping 20c. Fraternal Emblems 25c

One Man and This Machine Will Earn $50 to $100 Daily Profit

Not a dream—not a myth—but a reality. If you are honest—earnest, and anxious to go in business for yourself, **I will help you.** I have helped lots of men to make from **$500.00 to $1500.00** per month. It's an honorable business—can be started most anywhere, in any town of over 500 population.

A GOOD BUSINESS PROPOSITION

You want a business of your own. Go into the Popcorn Crispette business and make $2000.00 to $7000.00 a year. All you need is a machine, a few dollars and a good location. You can learn to make Crispettes in a day. They sell everywhere for a nickel a package. You make almost four cents profit.

SEND FOR FREE BOOK

It tells the whole story—how and where to start, how to succeed, gives experiences of others, etc. It's worth reading, even if you don't start. If you're looking for a good thing and easy money, write today for **FREE BOOK.**

Eakin made $1500.00 in one month with a Long Crispette Machine in a store window.

You can do equally as well, or even better.

W. Z. LONG CO.
1255 High St., SPRINGFIELD, OHIO

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1255 High St., Springfield, O.

Without any obligation at all, please send me free, your book, "Dollars and Sense in the Crispette Business.

Name.....

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The "One Dip" Pen

Writes 600 words with one dip of pen

Why use ordinary pens with the never ending dip—when One Dip Pens make every penholder virtually a fountain pen? Send 10c for Sample Package.

AGENTS WANTED

ONE DIP PEN CO.
34 DAILY RECORD BLDG. BALTIMORE, MD.

FREE 10 DAYS TRIAL

LATE MODEL

UNDERWOOD TYPEWRITER $43.85

Equipped with late improvements—two color ribbon, back spacer and tabulator. Shipped to you express charges prepaid, without one cent advance payment. After you have thoroughly examined and tried the machine and are satisfied with it in every way, you pay our special cash price of $43.85 (less than half manufacturer's price), or we will arrange an easy payment plan for you. **We pay all charges.**

All machines guaranteed 5 years.

Write today

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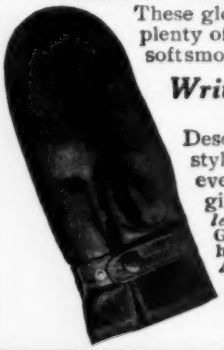
72 Front Street Brooklyn, N. Y.

Cold?

THE warmth and easy fit of Hansen Gloves keep your hands cozy and blood circulating, and the strong horsehide protects perfectly and *looks right.*

Hansen Gloves

With or Without Lining



These gloves and mittens have plenty of style, with fit and the soft smoothness of the *out* seam.

Write for New Free Glove Book

Describes many of the 500 styles—mittens too—for every occupation. All giving *most value* for *least cost.* Get Hansen Gloves from your dealer. If he is not supplied, write us. Anyway, write for book.

O. C. Hansen Mfg. Co.
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Milwaukee, Wisconsin

Powerlight

Again awarded Gold Medal Int. Exp. Only Portable Lamp approved by Underwriters. Highest endorsement—Used by U. S. Gov. Army. Burns Common Kerosene or Gasoline. Equal Safety. 335 C. P. 20 Hrs. 1 qt.

LOW COST—BIG PROFITS

No Wick. No Chimney. No Torch. No Danger. No Odor.

Positive guarantee—Sells on sight—No experience necessary. 20 Styles—Contract exclusive territory. Samples Loaned.

POWERLIGHT CO., 543 Broadway, NEW YORK

AGENTS WANTED

for safe and dependable 400 c. p. Akron Gas Lantern. Clear, brilliant, white light, 50 times stronger than oil; double mantle, mica globes, won't blow out or break. Smokeless, odorless, beautiful, economical.

AKRON LIGHTING SYSTEMS

and portable lamps excel in simplicity, quality and latest improvements. Write for agency terms and our Handy Demonstration Outfit.

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The "BEST" LIGHT

Positively the cheapest and strongest light on earth. Used in every country on the globe. Makes and burns its own gas. Casts no shadows. Clean and odorless. Absolutely safe. Over 200 styles. 100 to 2000 Candle Power. Fully Guaranteed. Write for catalog. AGENTS WANTED EVERYWHERE.

THE BEST LIGHT CO., 324 E. 5th St., CANTON, O.

TENNIS AN ANCIENT GAME—Tennis was known to the Greeks and Romans; it is mentioned in the Arthurian legends and in early records of the dark ages, says the Christian Science Monitor. It became very popular in France in the fifteenth century and in England during the century following. Henry VIII of England was very fond of the game, we are told. Nat-

LIGHT YOUR HOME LIKE DAY—COST 1c

for 6 hours. Pure white 100 candle power light from common Kerosene.

THE BEACON LAMP MAKES AND BURNS ITS OWN GAS

Better, brighter, safer, cheaper than Gas, Gasoline or Electricity. Every home interested. 500,000 satisfied users. Agents wanted. Write quick for selling plan, exclusive free territory and trial offer.

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Sunshine Lamp 300 Candle Power FREE

TO TRY IN YOUR OWN HOME

Wonderful new combined table and hanging lamp. Turns night into day. Gives better light than gas, electricity or eighteen ordinary lamps at one-tenth the cost. Costs only one cent a night. For homes, stores, halls, churches. A child can carry it. Makes its own gas from common gasoline. No wick. No chimney. No dirt. No smoke. No odor. Absolutely safe. **Guaranteed 5 years.**

Make $30 to $60 Every Week

We loan you sample. No experience necessary. Everyone a possible customer. Exclusive territory free. We want one person in each locality to whom we can refer new customers.

Take advantage of our Free Trial Offer.

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Uni-Lectric lighting plant generates standard 110-volt direct current; operates from one to 50 lights, electric motor, electric iron, vacuum cleaner, electric toaster, force pump, churn, washing machine, etc.

No Batteries — No Switch-Board

and a **better** machine for **less** money. High speed gasoline motor, generator and automatic governor, all complete in one small, compact unit. Uses standard lamps and fixtures. Simple, easily installed, dependable, economical. Costs less than other systems to buy and to operate.

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Write today for full description and low price.

Uni-Lectric
GASOLINE-ELECTRIC UNIT
LIGHTING-SYSTEM

urally, it has had many different names; in the Arthurian romances it is called "paume."

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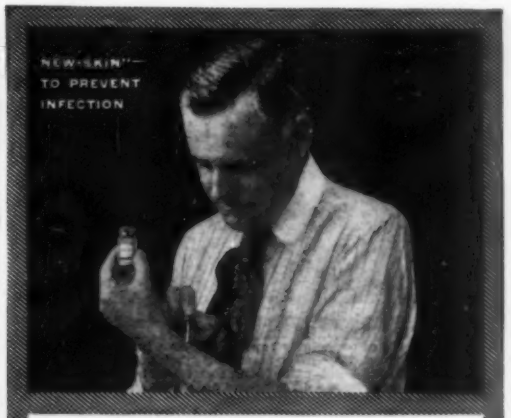
FREE OFFER

Turns night into day. 300 candle power. Carry as a lantern; use anywhere as a lamp. Weather proof. For house, barn, garage, camp and around the farm. Write for *big, free offer. Special opportunity to farmers, Stockmen and motorists. Agents make big money.*

WRITE TONIGHT for new 1916-1917 offer.
ACORN BRASS MFG. CO., 814 Uni-Lite Bldg., Chicago



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Kills Germs

Guard against infection. Use New-Skin on cuts and scrapes. It is an antiseptic liquid for use on every-day hurts. When it dries it forms a waterproof, tough film over the wound, protecting it from injury and excluding infection.

Keep New-Skin in the house. Carry a small bottle with you. And be sure to get genuine New-Skin. At all druggists, in two sizes, 10c. and 25c. The 10c. size will fit in your vest pocket.

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300 Candle Power of Light at a Cost of 1-8c Per Hour

Burns Kerosene or Gasoline

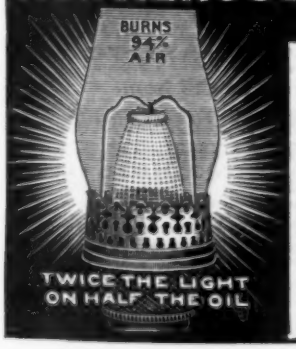
This lamp generates and burns its own gas from ordinary kerosene. "QUICKLIT" gasoline lamps can be lit with an ordinary match like city gas.

Write today for illustrated catalog of our complete line of kerosene and gasoline lamps, lanterns and lighting systems. **Agents Wanted**

The Nagel-Chase Mfg. Co.
176 East Erie St., Chicago

New KEROSENE LIGHT BEATS ELECTRIC OR GASOLINE

10 Days FREE—Send No Money



We don't ask you to pay us a cent until you have used this wonderful modern white light in your own home ten days; then you may return it at our expense if not perfectly satisfied. You can't possibly lose a cent. We want to prove to you that it makes an ordinary oil lamp look like a candle; beats electric, gasoline or acetylene. Lights and is put out like old oil lamp. Tests by U. S. Government and 34 leading Universities show that it

Burns 50 Hours on One Gallon common kerosene (coal oil), no odor, smoke or noise, simple, clean, won't explode. Three million people already enjoying this powerful, white, steady light, nearest to sunlight. **Won Gold Medal** at Panama Exposition. Greatest invention of the age. Guaranteed.

$1000 Reward will be given to the person who shows us an oil lamp equal to the new **Aladdin** in every way (details of offer given in our circular). We want **one user in each locality** to whom we can refer customers. To that person we have a special introductory offer to make, under which one lamp is **given free.** Write quick for our 10-Day Absolutely Free Trial Proposition and learn how to get one free. **Yours FREE**

Men With Rigs Make $100 to $300 Per Mo. Our trial delivery plan makes it easy. No previous experience necessary. Practically every farm home and small town home will buy after trying. One farmer who had never sold anything in his life before writes: **"I sold 51 the first seven days."** Christensen, Wis., says: **"Have never seen an article that sells so easily."** Norring, Iowa, says: **"92 per cent of homes visited bought."** Phillips, Ohio, says: **"Every customer becomes a friend and booster."** Kemerling, Minn., says: **"No flowery talk necessary. Sells itself."** Thousands who are coining money endorse the **Aladdin** just as strongly. **NO MONEY REQUIRED.** We furnish stock to reliable men to get started. Ask for our distributor's plan, and learn how to secure an appointment and make big money in unoccupied territory. State occupation, age, whether you have rig or auto; whether can work spare time or steady, when can start; township most convenient for you to work.

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YOUR FEET at HOME

It's real rest and pleasure to slip your tired feet into a pair of light, pliable YIPSI INDIAN moccasins, after a hard day in heavy, stiff shoes. Made of especially tanned leather, hand sewed—they are soft, pliable and conform to the natural shape of the feet. An ideal dressing slipper—just the thing for the den—equally attractive to men, women, boys and younger children. While light and flexible, they are built to last for years.

Try a pair for yourself; and remember that they make an excellent Christmas present for anyone. Every pair of Yipsi Indian Shoes sold on our money-back guarantee plan. All sizes.

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Men's sizes, 5½ to 10 . . **$2.50** Women's sizes, 2½ to 7 . . . **$2.25** Boys' sizes, 2½ to 5 . . . **$2.00**

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Ladies' sizes, 2½ to 7 . . **$3.15** Misses' sizes, 11½ to 2 . . **$2.75**

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Contains the cream of 1000 practical and distinctive bungalows actually built for $400 to $4000, suited to any climate, with photos of exterior and interior views, plans, size of rooms, cost, etc. Also valuable suggestions on bungalow building written by an expert. **The largest exclusive Bungalow Book published. 112 pages. Price.....** **$1.00** Postpaid

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Sell Crown Fuel Savers!

Guaranteed to save 20% in fuel or No Pay. Every Coal Buyer owning a Heating Plant is a prospective customer. If you are a capable man you can build a mighty Big Business in your locality.

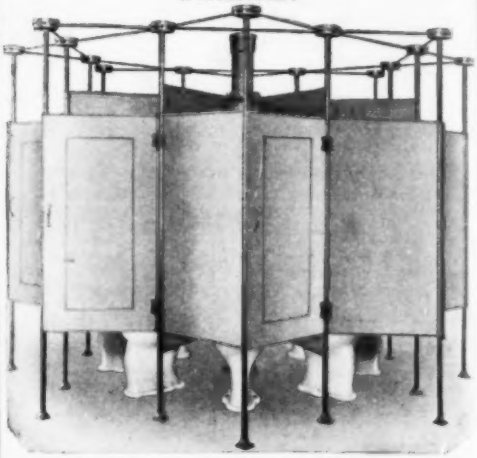
We Do Not Sell Territory!

But if you are a live wire, able to place a small order to start, ordering larger quantity later, we will **give** exclusive selling rights and a discount that will make you more money than any other business proposition ever offered. The Season is HERE and you must act QUICK. Send for our "*Book of Facts*" and retail prices.

Crown Fuel Saver Co., 724-30 N. La Salle St., Chicago

KELLY OCTOPUS Water Closet Combination

(PATENTED)



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Anyone can install and operate an HB Generator. Have lights when you want at little cost. 30, 50, 100 light sizes. Special Movie Arc Generator. **$10 Gives You One of These Machines,** the balance in small payments. Mail this ad with your name for particulars.

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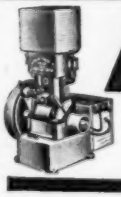
make comfort in the home



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MAIL a postal for it today. Get money-saving wholesale prices on rich, new style stoves and ranges, beautiful mission design hot-blast heaters—ranges with white enamel splasher backs, etc.

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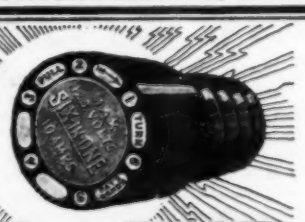

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—vim, vigor, vitality! The keen, vivid relish of youth for work and pleasure! **Snap, ginger, punch in every thought and action!** The joy of glorious health, strength, power, life—**yours through vibration.**

Wake up that sluggish circulation! Send the rich, red blood leaping along through every vein and artery! Tune up those jangled nerves! Stir up those sluggish organs! Flood your whole body with **health!** Don't be satisfied with mere existence! **Begin to live!**

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Try this wonderful machine yourself. Test it on your own body. Notice the difference after the very first treatment. See how pleasant and easy it is to use—how marvelous the results. And don't forget that these results are permanent because vibration gets right at the cause of things—goes to the very root of the trouble. Aches and pains vanish like magic. You don't need to take **anybody's** word for these things—you can find out for yourself.

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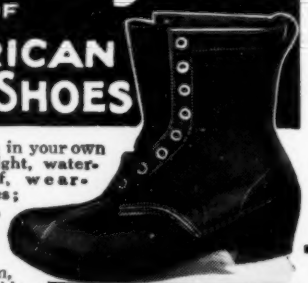

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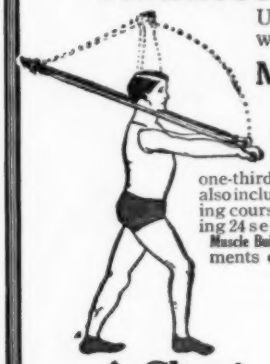

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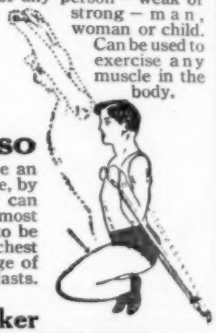

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with each outfit, I will give an extra handle, without charge, by which the **Muscle Builder** can instantly be converted into a most effective Chest Expander to be used for developing the chest and lungs. Take advantage of this opportunity while it lasts. Send your order today.

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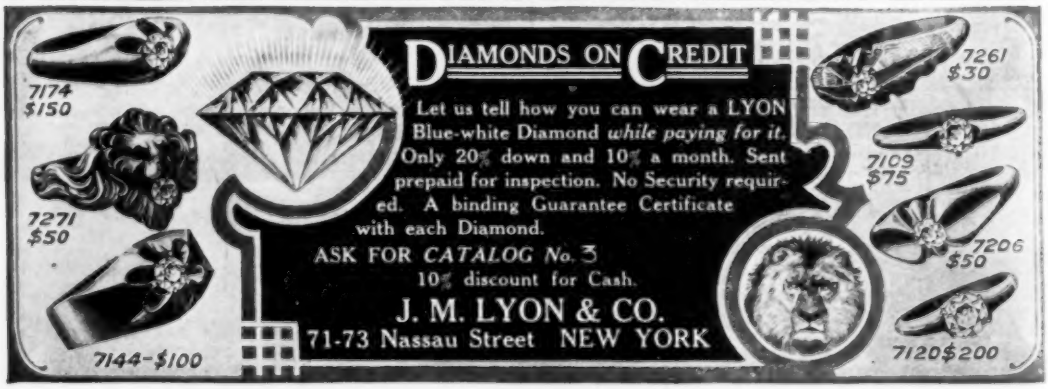

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58 REQUESTS for Miscellaneous articles in all classes of invention, too numerous to mention.
73 REQUESTS for General Novelties and Mail Order articles.
54 REQUESTS for Household Novelties and Specialties.
16 REQUESTS for Sheet Metal Novelties.
10 REQUESTS for Automobile Specialties.
6 REQUESTS for Hardware Specialties.
5 REQUESTS for Electrical Specialties.
5 REQUESTS for Toys.
6 REQUESTS for Machinery.
3 REQUESTS for Advertising Novelties.
3 REQUESTS for Wooden Novelties.
2 REQUESTS for Window Shade Fixtures.
2 REQUESTS for Printing and Reproducing Apparatus.
4 REQUESTS for Agricultural Implements.

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REFERENCES

Second National Bank, Washington, D. C.; Union Savings Bank, Washington, D. C.; Chamber of Commerce, Washington, D. C.; Pitner Gasoline Lighting Co., Chicago, Ill.; R. G. Dun & Co., Washington, D. C.; Smethport Glass Co., Smethport, Pa.; The Melvin Gauge and Signal Co., Scranton, Pa.; M. Winter Lumber Co., Sheboygan, Wis.; National Savings and Trust Co., Washington, D. C.

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A rich Eastern company desires to purchase patents upon improved "rifles, guns, cannons and machine guns of any kind." The European War has created an insatiable demand for anything in this line.

A very well known company manufacturing sheet metal products desires to purchase patents upon "revolving or stationary ventilators, such as used by schools and mills, or some window ventilators made of sheet metal." They are also interested "in steel window sash or upon skylight frames made of wrought sheet steel."

An Eastern financier wants to obtain a patent upon a dry cell (electric battery). Past experience has shown that there is a great demand for anything of this kind.

A very successful promoter desires to take up the promotion of patents covering improvements "on auto trucks and farm machinery." He is also interested "in improved railroad cars both freight and passenger."

Results Speak Loudest—But Here Are Some References

Columbia National Bank, Washington, D. C.
National Locktile Co., Washington, D. C.
The Carnahan Press, Washington, D. C.
Lightning Gun & Cycle Works, Oklahoma City, Okla.
Antholene Mfg. Co., Hutchinson, Kans.
National Rack Co., 61 Hannover St., Boston, Mass.
The C. J. Loftus Co., 13 Spring Common, Youngstown, Ohio
Whitehead Hosiery Mills, Burlington, N. C.
Dickinson Mfg. Co., Des Moines, Iowa.

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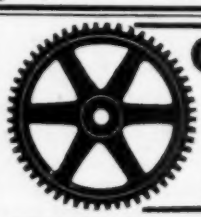

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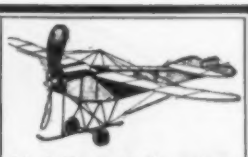

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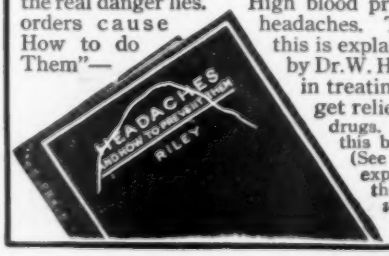

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We will trust you if you desire. Buy a Jahant Furnace now. A payment down and you can pay the rest in easy monthly payments—**pay as your Jahant saves on your Coal Bills.** A Jahant will pay for itself in a few months.

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Our Heating and Ventilating Engineers fit one of the eight Jahants to **your home.** You get **everything** needed. Every part cut to fit. Complete simple instructions for setting up. Any man who can read can set up a Jahant in a short time. Our Engineers' advice FREE.

FREE We give absolutely free a complete set of tools for erecting your Jahant Furnace. Get book "What Users Say" and literature, absolutely free. Heat your home better, easier, at a lower cost. Begin saving at once quickly. NOW.

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We give a 360 day legal Guaranty Bond with every Jahant furnace installed according to plans. If at the end of 360 days it is not satisfactory it can be returned and the money will be refunded. You judge a Jahant from actual experience.

THE JAHANT HEATING CO., 32 Jahant Bldg., Akron, Ohio, U.S.A.

This picture symbolizes
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The men who get big pay are those who are ***trained*** to earn it. Your pay is small because you have no special training—***and you only are to blame.***

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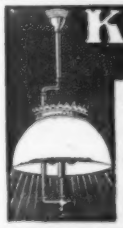

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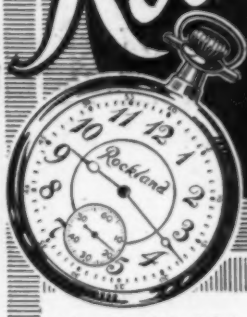

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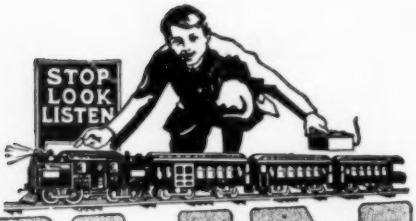

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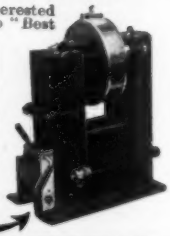

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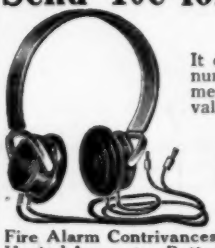

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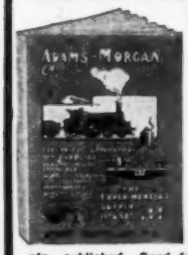

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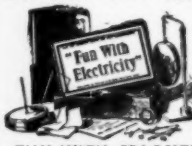

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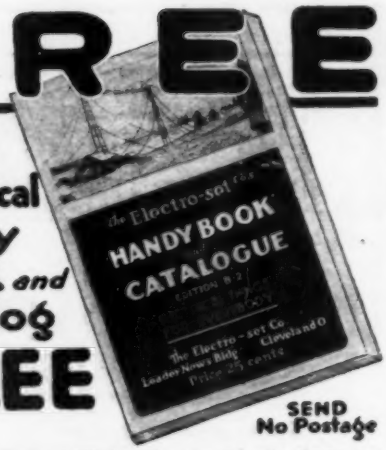

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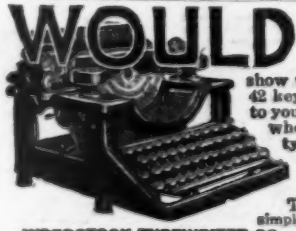

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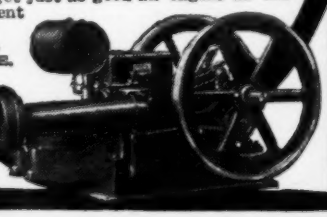

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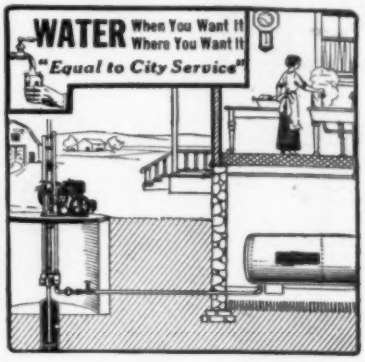

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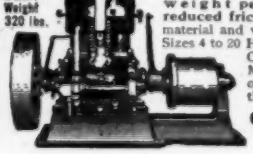

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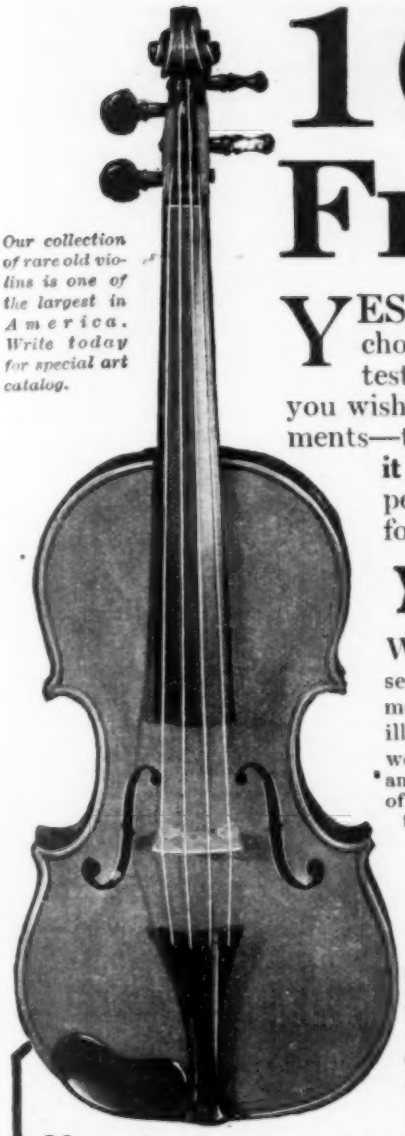

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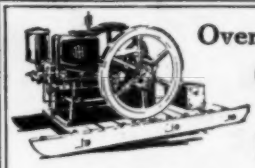

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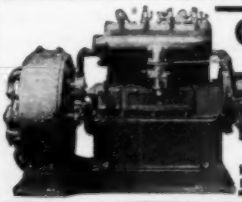

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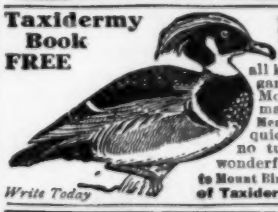

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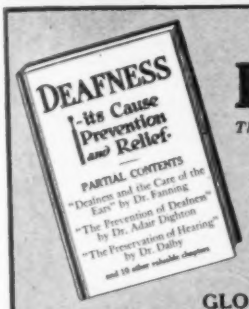

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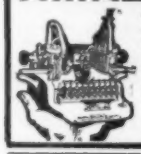

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Any appliance is a truss. Ruptured people must wear some kind of support. Our New Sponge Rubber Pad (pat'd) is velvety, soft to the skin, pliable, cannot slip, extremely comfortable, adapts itself to ruptured parts with less pressure, is sanitary, long lived. Massages and strengthens muscles, allows blood circulation and produces many cures.

52 Styles of Trusses
25 Different Pads

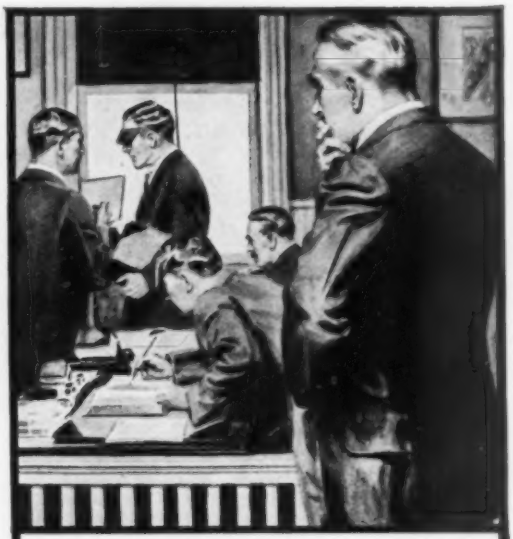
New Scrotal Pad Needs No Leg Strap

Our new scrotal pad (pat'd) holds 8 out of 10 cases of hernia perfectly without strap between legs.

Free Sample Pad A Sample Akron Sponge Rubber Truss Pad (pat'd) will be sent absolutely FREE upon request, also booklet "Relief to Truss Users." It's full of helps. Ask your dealer, or write us.

THE AKRON TRUSS CO. Dept. 72. Akron, Ohio

Please Mention Popular Mechanics



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- ☐ Electric Lighting
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Inner surface is made adhesive to secure the PLAPAO-PAD firmly to the body, keeping the PLAPAO continually applied and the pad from slipping. No straps, buckles or springs attached. Soft as velvet—easy to apply.

It's the Non-Slipping, yet Non-Rigid Pad and What is Within It That Counts

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To the extent of 5,000 sufferers who may apply I will send, ABSOLUTELY FREE, a sufficient quantity of the Plapao to positively convince them that this is the only logical, common-sense way of treating rupture. Plapao is a highly astringent medication placed within the Plapao-Pad and being absorbed through the skin, creates a wonderful feeling of relief and at the same time tends to strengthen the weakened muscles and thus permanently close the rupture opening. The process of recovery is natural, so you'll have no use for a truss—you can throw it away forever! Old and young have testified under oath that the Plapao-Pads cured their rupture—many of them long-standing, aggravated cases—without delay from work. Patent allowed in U. S. and foreign countries. Awarded Gold Medal at Rome and Grand Prix at Paris.

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EXPRESS PREPAID $2.75

Pants cut in the latest style. Made to your individual measure. Fit, workmanship and wear guaranteed.

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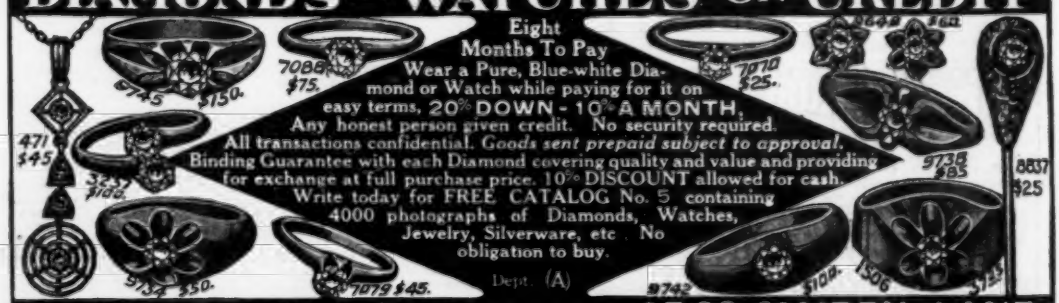

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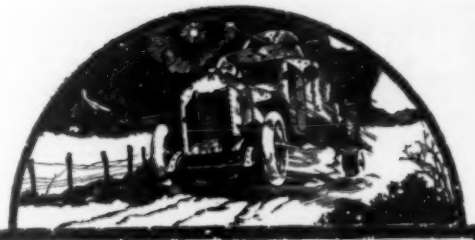

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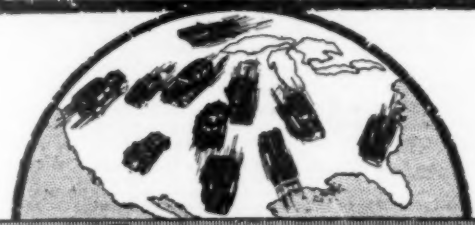
"Everywhere in America"



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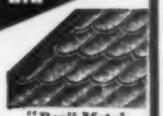

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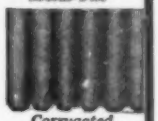

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This offer was never made before

To smokers—and friends of smokers:

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Wherever La Sultana is smoked it makes friends. It already has made so many that we have had to more than double our factory. But we want it to have more! So we are making this special Christmas offer:

We will ship to any address in United States territory, fully prepaid, a box of 12 La Sultana Cigars on receipt of sixty cents—provided you furnish us with your dealer's name and address.

This offer holds good until December 31, 1916.

Why We Do This: La Sultanas are sold by cigar dealers generally. This special offer is made to help these dealers by introducing this fine and popular new cigar in their territory. Trial means sales. Duplicate orders will not be supplied by us. For all subsequent purchases you will go to your cigar dealer. If he hasn't them already, arrange with him to carry La Sultanas for you.

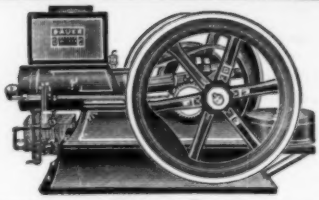
Manufactured by

Tobacco Corporation of America

148B West 52nd Street New York City

Reference: Hudson Trust Co., N. Y.

Better Built BAUER Kerosene Engines



COMPARE these new prices, for guaranteed successful Kerosene engines. Cash or Easy Terms. 2 H-P, $34.95; 3 H-P, $52.00; 5 H-P, $72.60; 7 H-P, $99.45; 9 H. P., $141.00; 12 H-P, $196.50; 15 H-P, $245.70; 18 H-P, $297.60. Portable engines equally low in proportion. For over 22 years our engines have proved to be leaders in low fuel cost—easy to run—and durable.

60 Days' Trial; 5-Year Guaranty

Get your power from your Kerosene can. Kerosene is safer than gasoline—and cheaper.

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Mullins Steel Boats Can't Sink

When you think of buying a boat, whether it be a 16 foot Runabout, a big 26 foot Auto Boat, or something in between—remember that Mullins Steel Boats are guaranteed for life. They cannot sink, leak, waterlog, dry out or open at the seams—never require calking. Designed by America's foremost naval architects—built in the largest boat factory in the world. More than 60,000 in use. Big catalog of steel or wooden motor boats, rowboats or canoes, on request.

THE W. H. MULLINS CO., 767 Franklin Street, Salem, Ohio

LOWEST PRICE BOAT IN THE WORLD

$89 for 15-foot boat finished ready to run, with either inboard or outboard motor.

Builder-Agents Wanted

$25 for complete k. d. boat—oak frame—cypress planking.

Free Catalog—100 Boats

BROOKS MFG. CO.

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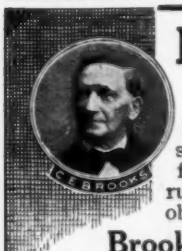

Don't Wear a Truss

Brooks' Appliance, the modern scientific invention, the wonderful new discovery that relieves rupture will be sent on trial. No obnoxious springs or pads.

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Has automatic Air Cushions. Binds and draws the broken parts together as you would a broken limb. No salves. No lies. Durable, cheap. Sent on trial to prove it. Protected by U. S. patents. Catalogue and measure blanks mailed free. Send name and address today.

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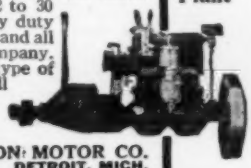

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"JUDO"
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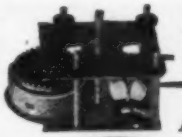

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In Tonal Quality and Music Value With Your Own Cabinet

An amazing money-saving offer on a fine phonograph. **$7.85**

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Finest phonograph. Same number of parts. Now on this offer, $7.85. Make your own cabinet. Or use a table or other piece of furniture. No secret. We explain all to you. Metal exposed parts heavily nickeled. Reproducer alone of this quality cost you $7.85 to $15. Plays Victor, Little Wonder, Columbia, and all lateral records up to 12 inches. Motor full force spring with speed regulator. Send today for full set working parts with screws, nuts, etc., and all instructions complete. Limited offer, $7.85. Your money back if not satisfied.

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New Way to fire your engine. Revolutionizes ignition in gasoline engines. A firing flame instead of your tiny spark. A burst of flame. The Triumph Hot Firing Tube changes your spark to a spreading flame. Consumes all the gas. Keeps your spark plug clean. Keeps your cylinder clean. Puts more power in your engine with less gas. Quicker pick up. Gives you better control of your car. Send for a set today.

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Makes your spark plug a blazing torch. Puts a powerful flame in the cylinder on every spark. Instantaneously fires all the gas. Marvelous increase of power in every explosion. Put the Triumph Hot Firing Tubes on your spark plugs now—one for each spark plug. Send for a set today.

30 Days' Free Trial $1.25 EACH

Use the Triumph Hot Firing Tubes 30 days at our risk. If they don't do more than we claim, return them and get your money back in full. Only $1.25 each. Set of four, $5. Set of six, $7.50. Prepaid to you on this money back offer. Send today.

Send Coupon

Or copy it on a piece of paper. Send for a set of tubes today.

Shaw Mfg. Co.
Dept. 5244
Oak Park, Ill.

COUPON

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Name.....

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Standing Back Of Those CLAIMS With A Bona Fide GUARANTEE To MAKE GOOD Or REFUND The MONEY, Beats Columns of Stereotyped "PIPE TALK;" *Every Purchaser Shall Be The Judge.* PERFECT COMBUSTION Reduces The ENTIRE Charge of Tobacco To ASHES and SMOKE; Absolutely Proving That SALIVA *NEVER WAS* Responsible for the Odious "JUICE" Nuisance, in *ANY* Pipe. An Open SAFETY Pocket Pipe. As Efficient as Unique. Ascertain The FACTS To Our MUTUAL SATISFACTION.

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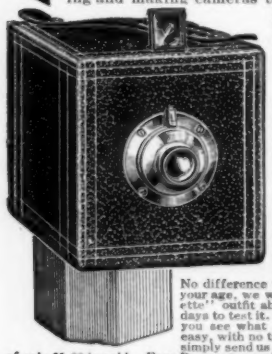
This Marvelous Camera on FREE TRIAL!

Only 10,000 of these marvelous, instantaneous picture-taking and making cameras to be sent out absolutely on approval without a penny in advance just to prove that it is the most wonderful invention—the camera sensation of the age. So **you** must send for it **quick!** Just think of it—the new Mandel-ette takes and makes finished pictures



INSTANTLY!

You press the button, drop card in developer and in **one minute** take out a **perfect, finished** post card photo, 2½x3½ inches in size. Camera, itself, is about 4½x5x7 inches. Loads in daylight 16 to 50 post cards at one time. No Films—no Plates—no Dark Room. Not a bit of the mess and bother of the ordinary kodak or camera. It is instantaneous photography. Universal focus lens produces sharp pictures at all distances. Pictures develop and print automatically. Can't overdevelop; results simply amazing.

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No difference who you are, where you live or what your age, we will send you the complete "Mandel-ette" outfit absolutely on approval and give you 10 days to test it. If not satisfactory return it. But when you see what elegant pictures it takes—so quick, so easy, with no trouble at all—if you wish to keep it you simply send us $1.00 per month until our special price of only $5.00 is paid. Easy Payments—no References. No red tape of any kind. Monthly payments so small you'll not notice them. Lots of fun and big profits. No Experience Required. Plain instructions and everything complete with outfit so you can begin taking pictures the moment it arrives. We guarantee that even a child can operate it. Mail coupon right now. No risk or obligation to keep camera.

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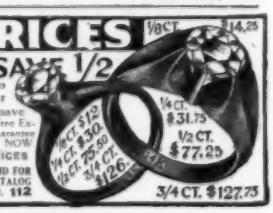

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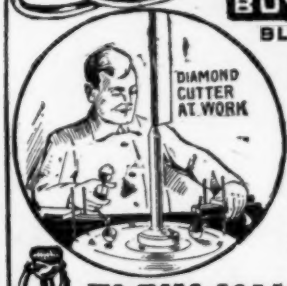

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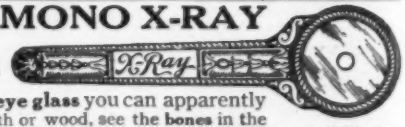

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The picture at the left shows how to use the new American Safety Hair Cutter, the most useful machine for men since the safety razor. The

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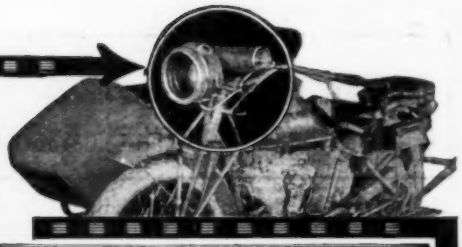

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Every motorcycle rider needs safe, brilliant, dependable light just as much as he needs fuel. Prest-O-Lite has *proved* itself to be the only reliable, economical, efficient light for motorcycles.

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Save Half In Fuel. The 1917 model Weber solves the problem of low cost power for all time. Power and speed controlled by throttle, same as steam. No waste of fuel—no violent explosions. Throttle regulates amount of fuel to size of load.

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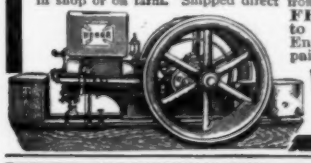

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Absence of vibration is indispensable to continued "sweet-running" of a marine motor.

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Grinds any Kitchen Knife or Shears in 10 Seconds

Absolutely Guaranteed

Make as Much Money Next Week as These Men Are Making Now

J. C. Lewis, of Kansas, says: **"I have sold one hundred Sharpeners in four days."** Hobart Kerr, of Md., writes: "The women can hardly wait till they get them." Herbert Cain, of Ky., sold nine after supper. At the end of his first day, J. W. Gordon, of Pa., writes: "I have sold two dozen, and **I sold to every one I saw."** Wm. G. Hall, of N. J., says: "I think it is great. I sold six in about one-half hour. The machine is a mighty fine proposition. **I am a mechanic and I know what I am talking about."** Peter Courtland, of Mich., writes: "I received your sharpener and opened it in a barber shop. I ground his shears and I got an order for one right on the spot." H. A. Henkel, of Va., says: "I have examined it and find it a wonderful little machine. **The workmanship is simply perfect."** Frank King, Colo., says: "Sample received Saturday. Sold ten today. Sell to most every house." Forest Webb, of Pa., says: "Went out Monday afternoon for about three hours and received one dozen orders. **Profit $12.00."** H. Tillery, of Tenn., wrote: "I took three orders first hour. When you sharpen an old, dull knife, dull as a hoe, in less than a minute, **they sit up and look."** Ray Carter, of Mass., writes: "I went out two days and have orders for thirty sharpeners." **Profit $30.00 for first two days.** John Durr, of Wis., also says: **"I have sold thirty in two days."**

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No. 627 Sharpener Building

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Late Model
No. 10 Visible
REMINGTON TYPEWRITER

Guaranteed
5 Years

$42.50

Express Charges
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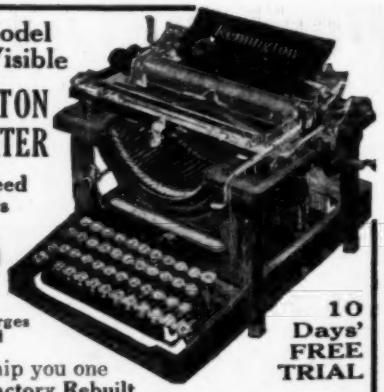

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We will ship you one of these **Factory Rebuilt Remington Typewriters** and allow you to use it for ten days, free, so you can prove to your own satisfaction what a wonderful bargain this offer is. At the end of ten days if you are not *perfectly* satisfied with the machine, return it at our expense. Think it over. Could any better offer be made?

The Remington Typewriter is used the world over and has been for thirty-eight years. The Remington is a typewriter which will stand the wear and tear for years. We know what the machine will stand, otherwise we would not offer our iron clad guarantee for five years. These typewriters are equipped with back spacer, two color ribbon device, column selector, and all latest improvements.

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Rebuilders of All Standard Typewriters

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With any name engraved on it in white **FREE.** Choice regular — safety — self-filler. 14 kt. solid gold; satisfaction guaranteed. Price $2.50 each. Special prices for quantities.
AGENTS WANTED — Some exclusive territory still open.
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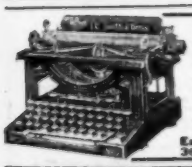

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working spare time or steady in your own locality for largest concern of its kind in the world. Not necessary to be away from home nights. No previous experience necessary. Work consists in leaving in homes on free trial a wonderful new household necessity needed in every rural home. Awarded Gold Medal. Greatest invention of the age. Tested by the U. S. Bureau of Standards and thirty leading universities in comparison with article, now in general use, and found to be four times as efficient. Benefits every member of the family; brings cheer and happiness to the home. **No investment or bond necessary.**

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For a longer time than any other engine manufacturer, I have been selling engines on trial, direct from my factory to the user. Every engine I ship must make good my guarantee. Send me your name so I can send you the most liberal trial offer I ever made.

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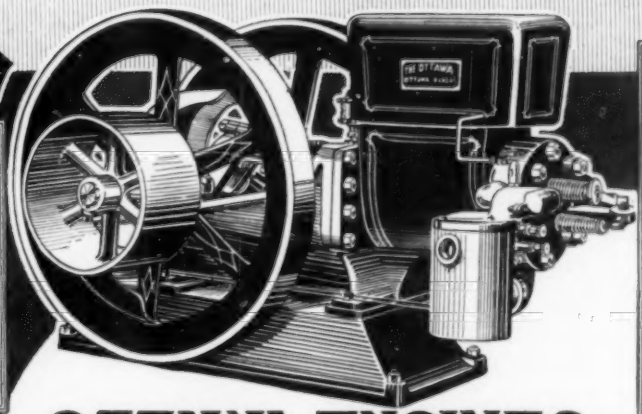

Here are my Latest Prices

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1½ H-P	$ 29.75
2 H-P	31.25
2½ H-P	35.90
3 H-P	49.50
4 H-P	65.75
5 H-P	72.50
6 H-P	93.90
7 H-P	98.50
8 H-P	124.75
10 H-P	139.50
12 H-P	191.50
14 H-P	245.50
22 H-P	369.90

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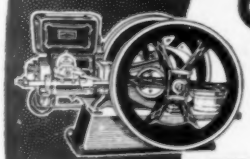
1½ H-P	$ 30.40
2 H-P	36.40
2½ H-P	44.50
3 H-P	58.50
4 H-P	81.75
5 H-P	99.75
6 H-P	119.75
7 H-P	124.75
8 H-P	149.95
10 H-P	174.50
12 H-P	229.50
16 H-P	289.50
22 H-P	439.90

OTTAWA ENGINES

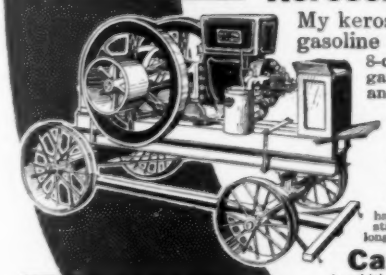


The Ottawa gasoline engine on iron subbase equipped with magneto requiring no batteries

Thousands of men all over this country, in shops, elevators, mills, factories, and on farms, have made my engine pay for itself while they used it. My money-saving terms of purchase make it easier to own an engine than to be without one. Having the largest number of sizes to choose from, you can find a size of engine just suited to your work, and you have your choice of the fuel, for my engines use.

Kerosene Oil, Gasoline, Distillate, and Gas

My kerosene oil engine is easy to start and as easy to operate as any gasoline engine. With it, you get more power from a gallon of 6 or 8-cent kerosene, than you can get from a gallon of 20 or 25-cent gasoline in any gasoline engine. All sizes are easy to start, easy to understand and manage, and with my lower prices and fuel saving engines, you get the greatest amount of dependable power for years to come, for the small amount of money you put into your engine.



90 Days' Trial — 10 Year Guarantee

You have 90 days in which to try my engine at your own work. I have always given my customers this right. Years ago I was the only engine manufacturer selling direct from my factory and the only one who sent every engine out on trial. Now many have imitated my plan of selling, but they haven't built as good an engine, because their engines are still in the experimental stage. You are taking no chances in selecting my engine, as it has been the longest sold direct to the user of any engine in America.

Cash or Easy Terms

My money saving plan of selling makes it easy for you to own an OTTAWA engine, on terms by which the engine cost can be paid for by the earnings of the engine. No need to trade your savings for 5 years to own a good engine, when you can get a better built OTTAWA engine to earn its own way while you use it.

The OTTAWA Kerosene engine on heavy trucks with complete equipment

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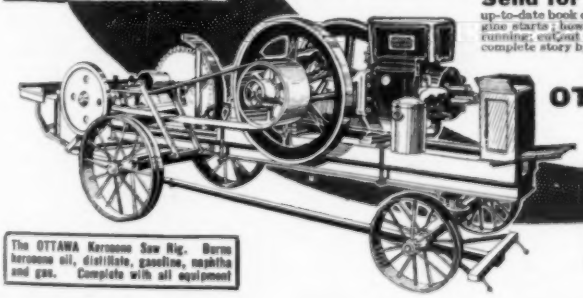
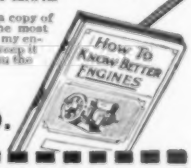


The OTTAWA Kerosene Saw Rig. Burns kerosene oil, distillate, gasoline, naphtha and gas. Complete with all equipment



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One Cent a Picture

The Expo loads in daylight with 10 or 25 Exposure Films, costing 15c and 25c respectively, and thus the picture taking part of a whole day's outing may be had for a very nominal sum — One cent a picture.

Easy to Manipulate

It is simplicity itself to operate. Takes pictures through the stem, where the Rapid Fire Lens is located. The photos (5/8 x 7/8) may be enlarged to any size.

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Time and instantaneous shutters; weighs but 3 ounces; nickel plated. Endorsed by amateurs and professionals the world over. Thoroughly practical—printing and developing of films just the same as ordinary cameras—in daily use by the police, newspaper reporters, detectives, and the general public. Important beats have been secured with the Watch Camera by enterprising reporters. Produces clear, sharp negatives indoors or outdoors equal to any camera on the market, size or price notwithstanding.

SOLD UNDER A POSITIVE GUARANTEE

The WATCH CAMERA makes an IDEAL CHRISTMAS PRESENT that will be thoroughly appreciated, and cause you to be long remembered.

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The very latest discovery in the scientific world. Hitherto, practically unobtainable except at an exorbitant price, we have at last succeeded in producing this remarkable LUMINOUS PAINT, which, applied to the surface of any article, emits rays of white light, rendering it perfectly visible in the dark. THE DARKER THE NIGHT, THE MORE BRILLIANT IT SHINES. Quite simple to use. Anyone—you can do it. A little applied to the dial of your watch or clock will enable you to tell the time by night. You can coat the push buttons or switch plates of your electric lights, match boxes, house numbers and innumerable other articles; make your own Luminous Crucifixes, Luminous Rosaries, etc. Bottle containing sufficient to coat several small articles, Price 25c. Larger sizes 50c and $1.00 postpaid.

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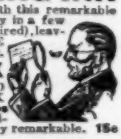
The most confidential messages can be written with this Ink, for the writing MAKES NO MARK. Cannot be seen unless you know the secret. Invaluable for many reasons. Keep your postals and other private memorandums away from prying eyes. Great fun for playing practical jokes. Only 15c Bottle

VANISHING INK

Writing written with this remarkable ink vanishes entirely in a few weeks (occurs if desired), leaving the paper QUITE BLANK. 15c p.pd.

LUMINOUS INK writing can be READ ONLY IN A DARK ROOM; writing shines like fire. Quite invisible at daytime. Very remarkable. 15c



DISSOLVING INK A new kind of invisible and vanishing ink combined. Writing is quite invisible, but can be made to appear or disappear at will in a very simple yet mysterious manner. Same PRICE, 15c postpd.

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NEW & NOVEL JOKE to play on your friends. Fits on your thumb, and "brands" your victims as you shake hands. Great fun. Won't wash off very easily, either. Any of these choice epithets: Owl, fool, liar, grouch, baby, chicken, hot air, bull, Safety First. Complete with pad and ink, 17c.

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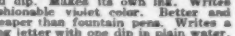

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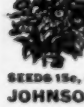
The Wonder of the World

10 Cts.

Japanese Rose Bushes **bloom all the year round.** Just think of it. Six weeks after planting the seed, the plants will be in **full bloom.** It may not seem possible, but we positively **guarantee it to be so.** They will **bloom every ten weeks.** Summer or Winter, and when three years old the bush will be a **mass of roses,** bearing from five hundred to a thousand roses on each bush. The flowers are in three shades—white, pink, and crimson. The plants will do well both in and out doors. We guarantee at least three bushes to grow from each packet of seed. **Price, 10c** packet, 3 pkts. for **25c** postpaid.

Shoo Fly Plant



A very remarkable Botanical curiosity you should have. Though quite odorless, flies will not remain in a room where it is grown. Bears very pretty blossoms; blooms summer and winter. Grows rapidly from seed.

SEEDS 15c, packet, 3 for 40c, postpaid.

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NATURE'S WEATHER PROPHET By mysterious changes that take place, this remarkable plant accurately forecasts the weather many hours in advance. Will grow anywhere all the year around. An interesting house plant. Bears large, fragrant, pink, butterfly shape flowers.

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Fires 20 Shots in One Loading

This is a regular size automatic revolver. Shoots B. B. shots obtainable anywhere, same as other rifles and guns. **Repeats 20 times with one loading.** Handsomely finished in gun metal. No caps or load necessary, as it works with a spring and shoots with rapidity and accuracy. Simply load with 20 B. B. shot, then press the trigger. Nothing to explode — absolutely harmless and safe. Remember, it is not a mere toy, but the same size and shape as a REGULAR AUTOMATIC. Sent complete with a round of shot for ONLY **25c** postpaid. Extra shot, **10c** a package.

Only 25c Postpd.

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Stops a leak in a minute

The finest repairer for Ironware, Agateware, Enamelware, etc. Good for kettles, pots, pans, boilers, and every kind of ironware, also for tin, copper, aluminum, ice boxes, iron pipes, cracks in stoves, broken china, porcelain, bric-a-brac, bisque, crockery, woodenware, marble, etc. Will not chip, fry, burn, bake or boil out. THE MEND IS THE STRONGEST SPOT IN THE POT. Could not be simpler; just mix the powder with water. HARDENS LIKE IRON. Fire-proof, Water-proof. You can fill a big hole or a small crack. Mended place stronger than new. Replaces chipped enamel. Anyone can do it; FAILURE IS IMPOSSIBLE. Better and easier than solder. Three sizes, 15 cents, 25 cents and 50 cents.

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Easy to Use

Stops the Pain; Stops the Tooth

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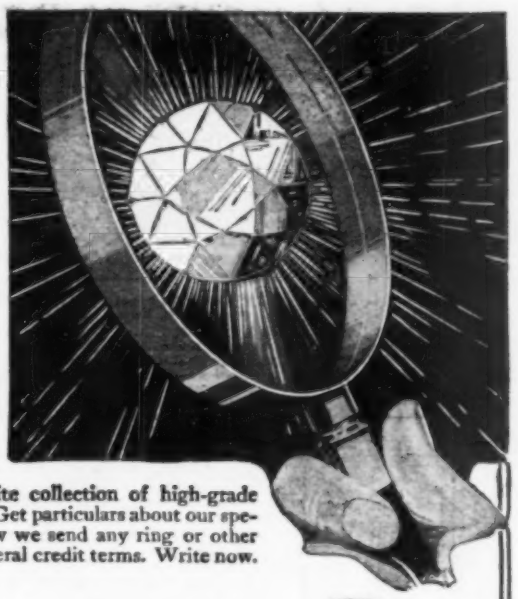

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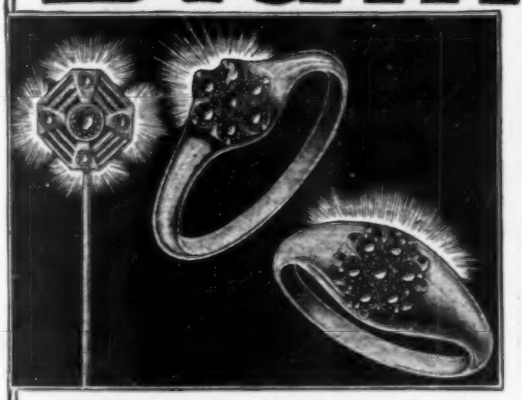
Diamonds



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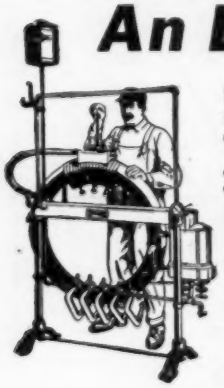

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When you talk about your Christmas bicycle, make up your mind about the tires that you are going to have on it.

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